THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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THE "CAVE" AT FALUN; A LESSON TO BE HEEDED.

A CATASTROPHE which recently occurred in one of the old mines at Falun, in Sweden, contains a warning which some American operators, particularly in iron ore, though not in iron ore only, might well take to heart. We are indebted to a communication by TURLEY, in the *Berg-und Hüttenmännische Zeitung* for the facts of the case.

The great copper mine at Falun has been worked for centuries, with varying energy and prudence; sometimes carefully and skillfully, sometimes recklessly and rudely. The old Swedish method, like that of the infancy of underground mining everywhere, was to stope underhand, leaving the hanging-wall of the vein to be supported, partly by timbers, and partly by occasional pillars of ore not extracted. Of course this method involves the loss of many tons of ore; and, as the timbers, when the mine has attained large dimensions, cannot be economically removed, their decay renders the old stopes exceedingly dangerous. The peril is increased when, as is usually the case with the iron and copper deposits of the old crystalline schists, the hanging-wall is so solid as to stand for years. In that case the fall, which is certain to come sooner or later, is likely to be extensive, reaching with disastrous effect not only the surface, but also other parts of the mine, in which operations may be still in progress. Mining engineers who have studied or traveled in Germany will recall many old workings, such as those, for instance, in some of the mines near Clausthal, which it is now forbidden to traverse, because they may at any moment, and upon the smallest provocation, collapse into ruins. Sometimes a venturesome explorer, disobeying the regulations, penetrates these realms of silent peril, and sees the empty vein-crevice, with smooth, unsupported walls, stretching above and below into apparently immeasurable distance—a picture more fascinating than any well-ordered mining operation ought to furnish. Visitors at the tin mines of Altenberg, on the Bohemian border of Saxony, will remember the great depression where a whole hill, honeycombed with ancient and decayed workings, went down at once—fortunately on a Sunday, when the devout miners were all at church. But our own mining industry, comparatively recent as it is, is not without instances of this kind. Numerous "caves," sometimes of considerable extent, have occurred along the "gouged" outcrops of our anthracite beds; and we could mention not a few mines of iron and other ores as well as of coal, which are driving surely forward to such a catastrophe. Of course we do not mean to say that a "cave" should always be prevented at any cost. On the contrary, when it can be directly caused and safely controlled, so as to destroy neither life, nor buildings, nor useful underground works, nor the opportunities of future mining, it may be the best thing that can happen. But the blind postponement of it by temporary devices, until it is certain to be a disaster when it does come, is short-sighted folly.

In many cases the pillars left in a mine are strong enough to keep it safe indefinitely. This is not the case with coal. Our miners leave as pillars usually one-third the coal—often even less; and in many instances the "creeping" and crushing destroys both the strength of these pillars as supports and their value for subsequent extraction, when the ground is finally to be cleaned up and abandoned. Moreover, the cave which then takes place often destroys entirely overlying beds, which have been recklessly neglected, because, for the time being, less profitable to exploit. In any event, no one will claim that pillars of coal can be left indefinitely. The decay or crushing of the gangway timbers would of itself make their economical extraction problematical. But we are now concerned chiefly with ore mines; and here the pillars which are left may be far more permanent. Fortunate is the mine, worked on this system, in which the vein offers a due proportion of "horses" and barren places. These, both economy and engineering art urge the miner to leave untouched; and they are not only far surer supports than masses of ore (too likely to slip on the walls); but they are also free from that great liability to destruction at the hand of man which besets all supports consisting of commercially valuable material. Some day or other, almost every mine falls into the temporary possession, at least, of robbers, who, for a little immediate gain, dig out what they can most easily reach. And this is the time when old pillars of ore are either wholly taken away or gnawed at until they are too weak to bear any longer the burden which through many years—centuries perhaps—has become adjusted with an equilibriated tension to their mass.

It is related that, long after MICHAEL ANGELO had died, leaving behind him as an immortal monument of his genius the great dome of St. Peter's—"a Pantheon in the air"—some monkish architect, ignorant of the nice calculations determining the proportions of that mighty structure, pierced with a small door and a narrow winding stair one of the four chief masses of solid masonry which support the dome. But MICHAEL ANGELO had not wasted his material; and it could not be safely diminished, even by the smallest fraction, without disturbing the distribution and adjustment of its strains. The result of this apparently trivial tampering with his plan was a crack in the dome, which is said to be still discernible—a significant testimony to the genius of a great engineer, and warning to the rashness of little ones.

Mining engineers could tell many tales involving the same mechanical principle, though less romantic; and of these the "cave" at Falun is the latest. The growing scarcity of copper ores in Sweden led to the "gnawing" of the old ore-pillars in the mines. In the Seventeenth Century, we are told, quite a number of large "caves" occurred at Falun; but after that came a period of skillful working, when vertical shafts were sunk in the country-rock, and the stopes on the vein were properly "gobbed" with waste rock. A relapse into the old system followed; and a long administration of careless working culminated in the great "cave" of 1833. Since that period the explorations of new ground have been comparatively unsuccessful; and for the last few years the product of the mine has been almost wholly from old "reserves," including the partial or complete robbing of pillars formerly left for safety.

We do not attempt, in the absence of complete knowledge of the circumstances, to condemn, unconditionally, the course pursued at Falun. That competent engineers advised a different course is, however, evident from the report made on the condition of this mine in 1867 by Dr. STAPFF, formerly professor in the Mining School of Falun, author of several able treatises in mine-engineering, and favorably known to American readers by his communications to the ENGINEERING AND MINING JOURNAL. In that report, Dr. STAPFF urged the adoption of over-hand stoping and "gobbing" or packing with waste rock, and prophesied, in the absence of such precautions, exactly the catastrophe which has come to pass. His plan was rejected, probably on economical grounds, and the old method was continued, until, from a point more than 1,000 feet below the surface, a tremendous collapse set in, the extent of which may be inferred from the circumstance that several acres on the surface sank about fifteen feet. Mining machinery and buildings are, of course, much damaged; and it is not yet certain that the disturbance is over. Of the numerous workmen in the mine at the time, all successfully saved themselves through the shaft, before it became choked—except one, who had gone back to warn his comrades, and who, following them out, was cut off by the intruding masses of rock. But he found his way to another shaft, and climbed up the pump-rods to safety. Probably one cause assisting this wonderful escape of the workmen was the previous warning which had been given them for several weeks by the frequent dropping of small fragments of rock and other signs, intelligible to experienced eyes and ears, that something unusual was impending. If they had realized that the whole mountain was "impending," and would straightway come crashing down, even the hardihood of miners would scarcely have sufficed to keep them at their posts.

It would be interesting now to compare costs, and ascertain whether in this case cheap extraction, resulting in the ruin of mine, machinery, and buildings, has, after all, been the most economical. As we have remarked, we do not attempt to judge this special case; and at all events it must be confessed that a mine worked for centuries, and almost completely exhausted, may be allowed to cave with some excuse. But this excuse cannot be pleaded for those American mines which are so worked as to invite premature and unnecessary destruction.

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CALCULATIONS OF BRIDGE STRAINS.

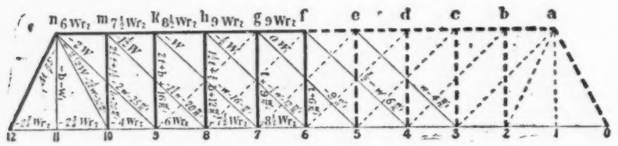
IN our review of Mr. BOLLER'S able treatise upon bridge construction, published two weeks ago, we had occasion, in speaking of the strains in trusses, to express preference for that mode of representing the application of the principles of the lever in which the algebraic expressions are written directly upon diagrams, and to make reference to the tabular method of performing computations, in terms of special commendation. We have deemed these subjects, more especially the latter, possessed of sufficient interest to warrant illustration, and have chosen for the purpose the form of truss known as "Quadrangular," perhaps in more general use than any other.

The lacing of a bridge truss contains properly no counters, although some of its members are commonly classed as such, but consists of two main systems, transmitting strain in opposite directions, and each extending beyond the center of the structure. In the accompanying diagram, one of these systems is represented by full, the other by dotted lines, and being precisely identical

the strains upon only one, the former, have been determined. The moving load is considered to advance from right to left—the maximum strain upon any strut, as k–9 and its corresponding tie k–7, existing when the panel at the foot of the tie and all to the right are loaded.

The expressions written upon the chords represent maximum strains, upon the lacing, vertical components of strains—those containing W being due to a full load, and where two expressions occur upon the same member of the lacing, the one in which W does not appear being maximum.

The indicated arrangement of the strain sheet, while neither new nor original, affords a means of computation, rapid, free from liability to error, applicable to any kind of truss and condition of loading, and in convenient form for preservation and reference—advantages which do not attain to so great a degree in the use of any other method given in books on bridge strains with which we are familiar.



MISCELLANEOUS DATA.

One truss, single track, through bridge; span, 0–12,= 150′; panel, 0–1,= 12½′; height, *a*–1,= 23′

Diagonal n–9 = $\sqrt{25^2+23^2}$=34′; Diagonal n–10 = $\sqrt{12\frac{1}{2}^2+23^2}$=26.2′

r=ratio of vertical to diagonal n–9 = $\frac{34}{23}$=1·48.

r_1=ratio of vertical to diagonal n–10 = $\frac{26\cdot2}{23}$=1·14

r_2=ratio of vertical to horizontal nk=$\frac{25}{23}$=1·08

r_3=ratio of vertical to horizontal nm, obviously = $\frac{r_2}{2}$

(In the expressions written upon the diagram, 2¾ Wr_2 and 1¼ Wr_2 are substituted for 5½ Wr_3 and 2½ Wr_3, the chord strains due to n–12 and n–10.)

w=l + b = assumed weight of truss per panel = 6,000 lb.
l= assumed weight of truss concentrated at each top panel point = 1,800 lb.
b= " " " " " bottom " " = 4,200 lb.
w_1= assumed moving load per panel = 18,000 lb.
W = w + w_1 = total assumed weight of truss and load per panel = 24,000 lb.
n = number of panels = 12.

$\frac{w_1}{n}$=$\frac{18,000}{12}$= 1,500 lb. (vertical).

$\frac{w_1}{n}r$ = 2,220 lb. (long diagonal).

$\frac{w_1}{n}r_1$ = 1,710 lb. (short diagonal).

lr = 1,800 × 1·48 = 2,664 lb. (long diagonal).
lr_1 = 1,800 × 1·14 = 2,052 lb. (short diagonal).
br = 4,200 × 1·48 = 6,216 lb. (long diagonal).
br_1 = 4,200 × 1·14 = 4,788 lb. (short diagonal).
Wr_2 = 24,000 × 1·08 = 25,920 lb.

STRAIN SHEET.

Chords.		Co-efficients of Wr_2.	Maximum Strains. +Compression. —Tension.
I.		II.	III.
Top chord	nm	6·0	+155,520
	mk	7·5	+194,400
	kh	8·5	+220,320
	hg	9·0	+233,280
	gf	9·0	+233,280
Bottom chord	12–10	—2·75	— 71,280
	10– 9	—4·0	—103,680
	9– 8	—6·0	—155,520
	8– 7	—7·5	—194,400
	7– 6	—8·5	—220,320

Column III. contains the products of Wr_2 (which is equal to 25,920 pounds) by the co-efficients in Column II.

Lacing.		Fixed Load. Top. Co-efficients of l, br, and lr_1.	Fixed Load. Top. Total strains due to top load.	Fixed Load. Bottom. Co-efficients of b, br, and br_1.	Fixed Load. Bottom. Total strains due to bottom load.	Moving Load. Co-efficients of $\frac{w_1}{n}r$, $\frac{w_1}{n}$, and $\frac{w_1}{n}r_1$.	Moving Load. Total Strains due to moving load.	Maximum Strains. +Compression. —Tension.
I.		II.	III.	IV.	V.	VI.	VII.	VIII.
Struts.	n–12	5·5	11,286	5·5	26,330	66	112,860	+150,476
	m–10	2·5	4,500	1·5	6,300	20	36,000	+ 40,800
	k– 9	2·0	3,600	1·0	4,200	16	24,000	+ 31,800
	h– 8	1·5	2,700	0·5	2,100	12	18,000	+ 22,800
	g– 7	1·0	1,800	....	....	9	13,500	+ 15,300
	f– 6	1·0	1,800	....	....	6	9,000	+ 10,800
Ties.	n–11	....	....	—1·0	— 4,200	—12	—18,000	— 22,200
	n–10	—2·5	—5,130	—2·5	—11,970	—30	—51,300	— 68,400
	n– 9	—2·0	—5,328	—2·0	—12,432	—25	—57,500	— 73,260
	m– 8	—1·5	—3,996	—1·5	— 9,324	—20	—44,400	— 57,720
	k– 7	—1·0	—2,664	—1·0	— 6,216	—16	—35,520	— 44,400
	h– 6	—0·5	—1,332	—0·5	— 3,108	—12	—26,640	— 31,080
	g– 5	....	....	....	....	— 9	—19,980	— 19,980
	f– 4	0·5	1,332	0·5	3,108	— 6	—13,320	— 8,880
	e–3	1·0	2,664	1·0	6,216	— 4	— 8,880	— 0

Column III. contains the products of the co-efficients in Column II., by l (equal 1,800), lr (equal 2,664), or lr_1 (equal 2,052).
Column V. contains the products of the co-efficients in Column IV., by b (equal 4,200), br (equal 6,216), or br_1 (equal 4,788).
Column VII. contains the products of the co-efficients in Column VI., by $\frac{w_1}{n}$ (equal 1,500), $\frac{w_1}{n}r$ (equal 2,220), or $\frac{w_1}{n}r_1$ (equal 1,710).

According as the member under consideration is vertical, a long diagonal or a short diagonal.

Column VIII. contains the algebraic sums of Columns III., V., and VII.

If the strain sheet is prepared as the basis of a bridge design, it will be convenient to employ additional columns for strains per square inch, sections, details, and weights.

It will be unnecessary, when familiarity with the method is attained, to write out the headings of the tables as fully as we have done; nor is it, in this case, recommended to write any expressions upon the diagram, other than the co-efficients of W, and Wr_2. Cross-section paper is well adapted to the making of such strain sheets.

NEW PUBLICATIONS.

VOLUMES XV. and XVI. of "The American Cyclopædia" complete the present edition of this admirable work—an edition which, having been completely re-written, and printed with a vast number of new and original illustrations, is, in fact, an entirely independent work, having little in common with the former cyclopædia of similar name published by the APPLETONS. Those who have participated as special contributors in the production of the book, have had ample opportunity to learn with what persevering and conscientious care the editorial work has been performed. If our own experience as journalists and publishers be a safe ground for inference, we must award the credit for the general accuracy, literary finish, and typographical perfection of these volumes quite as much to the fidelity and acuteness of the editorial corps under Mr. RIPLEY as to the degree of these qualities in the contributors. The latter gentlemen have to thank the editors for such valuable assistance in the way of suggestion and revision—a debt which the present writer, unable to repay in kind, hereby at least acknowledges.

The longest article in the present volume—perhaps the longest in the whole work—is devoted to the United States, and fills, including the survey of the literature of the country, more than 88 pages. It is a careful and compact summary, prepared by a number of experts, of the physical, social, commercial, political, and historical elements of the past career and present condition of the Republic, and forms a most appropriate *pièce de résistance* to be set before readers "in this Centennial year." We note that STERRY HUNT furnishes the geological, Prof. GEORGE THURBER, the botanical, and Comptroller JOHN J. KNOX the financial portion—names which indicate that this is no ordinary piece of compilation.

Of articles bearing directly upon mining or metallurgy, the volume contains but few, the title *zinc* occupying most space. The geological and chemical contributions of Prof. HUNT and JOY, the article *Turbine*, by Prof. THURSTON, and the article *Weights and Measures*, partly by Prof. HILGARD, are worthy the attention of Engineers.

Looking over the whole series of the volumes composing the "American Cyclopædia" we are impressed with its superiority, for general use, to any other in the English language, with which we are acquainted. The two tests which are constantly applied to a "Conversations-lexicon" are: first, that all topics likely to occur on conversation shall be treated in its pages; secondly, that what it says of them shall be comprehensive, clear, trustworthy, and adapted for the general reader, though not beneath the respect of the expert. These excellencies the "American Cyclopædia" possesses in unrivalled degree, together with the mechanical and literary perfection which people of culture require of books which they are to handle often. *

CONVERSAZIONE OF THE INSTITUTE OF MINING ENGINEERS.

THE regular Thursday evening meeting of July 27 at the rooms of the Centennial Committee of the American Institute of Mining Engineers was quite largely attended, about 60 being present. Among those were a number of the foreign judges at the Exhibition, most of whom will shortly leave Philadelphia, as their official labors are about finished. Prof. W. P. BLAKE, Commissioner in charge of the United States mineral exhibit, gave a very interesting general description of the various mineral districts in the United States.

INTERNATIONAL EXHIBITION OF 1876.

Special Report of the Engineering and Mining Journal.

ADMISSIONS FOR THE WEEK ENDING AUGUST 1, 1876.

Date.		Paying Visitors.	Press, Complimentary, and Exhibitors.	Total Visitors.
Previously reported		1,618,523	715,088	333,611
July 26	67th Day	22 929	9.986	32.915
" 27	68th "	24,846	9 979	34,825
" 28	69th "	18 924	10 057	28.981
" 29	70th "	15,952	8.168	24,120
" 31	71st "	15,207	8,789	23 996
August 1	72d "	22,195	7,961	30,156
Totals		1,738,576	770,028	2,508,604

A special rate of twenty-five cents a head has been granted, from July 26, to schools, asylums, etc., so that the numbers given above, when divided by two, will not, as heretofore, show the cash receipts.

AUSTRALIAN TIN AT THE PHILADELPHIA EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

(Continued from page 73.)

As yet the most important supplies of tin ore are those obtained from the river beds and gravel washings of older formations. Although considerable ground in which the ore deposits are found has been already worked out, it seems probable, from what is now known of the large amount of territory containing them, that it will be many years before they are exhausted.

A mine property covering an area of 160 acres on Vegetable Creek, has yielded a very large quantity of the tin stone. The lead, which has a width of about 200 feet, is in general easily worked, the ore dirt in some places, however, being covered with a ferruginous sandstone, which can only be removed by blasting. The stanniferous gravel is about three feet in thickness, and yields about one-sixtieth of its volume of the pure ore. This mine has produced a weekly yield of about 12 tons of ore by the aid of the labor of fifty men and two horses. The mine belonging to the Vegetable Creek Tin Mining Company, has been opened out to a considerable extent. A tunnel has been driven two thousand feet along the lead, which occurs in a tertiary gravel drift 60 feet below the surface. The width of stanniferous gravel in that distance has widened out from eighteen to four hundred feet, its thickness being about three feet. Above this main lead, or rather deposit, has been found another deposit of ore. In sinking a shaft to strike the large deposit, a hard layer of cement rock, fourteen inches thick, was struck immediately, under which was found a rich ore deposit from two to four feet thick. This mine produces about seven tons of ore per week, by the labor of forty-five men and two horses.

The process used for separating the ore from the dirt or gravel, with which it is mixed, is usually quite a simple one. When these deposits were first discovered, the common sluice box and sluice fork used in washing auriferous deposits were employed, but, the much greater masses of material which were operated on, made it necessary to modify the apparatus in order to economize in the use of water and labor. The first change made in the old form of apparatus consisted in enlarging the sluice box, and in introducing a hopper with a perforated bottom, through which the stanniferous dirt was fed into the sluice box. The perforated plate in the bottom of the hopper is made four feet long and two feet wide, and is perforated with holes ranging from $\frac{5}{8}$ to 1 inch in diameter, according to the size of the largest ore grains. The stanniferous dirt being mixed with water in the hopper, the ore and fine dirt pass through the holes in the hopper plate, while the large pebbles and boulder are retained in the hopper. The water used has generally to be raised by power, and considerable economy in the cost of working was effected by the substitution of horse for man labor in performing this operation.

The most important apparatus yet invented for the treatment of these tin-bearing gravel, is that invented by Mr. WM. H. WESLEY, manager of the Great Britain Tin Mining Company. He has introduced a hollow revolving cylinder three feet long and 1 foot 8 inches in diameter, which is composed of $\frac{1}{2}$ inch bars placed longitudinally with $\frac{1}{4}$ inch spaces between them, to allow the fine dirt and the ore to pass into the sluice box below. This cylinder is revolved through the agency of a belt and pulleys, which are moved by the wheel shaft of a California pump. The California pump is used to raise the water necessary for washing and slucing the ore. The revolving cylinder is placed on an incline of 3 inches, so that the ore dirt is fed in its upper end with about three-fourths of all the water used in the whole operation. The remainder of the water is directed in small streams on the pebbles and boulders as they are passing through the sieve, so that before they reach the discharge end, all the fine material is washed down into the sluice box. The boulders and pebbles pass out of the cylinder into a bin, from which they are removed and carted away. The sluice box is 3 feet wide at the top, narrowing down to 1 foot 6 inches at the bottom, and is 18 feet long. The cost of washing the ore by means of this apparatus, is as follows :

Two men feeding (shovelling wash dirt into sieve)...	$4.00
One man at head of sluice box.....	2.00
One youth behind sluice box	1.25
One horse removing tailings by truck.....	.83
One youth driving tailings.....	1.37
One horse removing hopperings and pebbles, by truck	.83
One youth driving hopperings and pebbles.....	1.37
One horse working pump, etc.....	.83
	$12.48

This cost includes what would require the labor of one man pumping water for the puddling machines, in which the ore dirt was at this mine first treated. This amount, $1.87, being deducted leaves $10.61, as the cost of working 65 tons of the puddled dirt, or about 16½ cents gold per ton. The machine costs from $300 to $350, when erected. In some localities the ore occurs in a conglomerated mass, which it is necessary to break up in puddling machines before it can be washed. This, of course, adds considerably to the cost of working the ores.

The specimens of stream tin which are displayed in the New South Wales exhibit in the Main Building are taken from a large number of workings, over fifty in all. These specimens vary considerably with regard to the size of ore grains, most of them, however, occurring as fine sand or pebbles. A considerable quantity of ore from the Deepsinkers Mine, in the Inverell District, which is exhibited, is in pebbles as large as egg coal. Some specimens of wood tin in boulders five to six inches in diameter, come from the same mine. The Buchart Mine on Copes Creek yields a quite pure ore in grains, a little larger than peas in size. Quite a number of rocks of this ore have been sent on here for exhibition. A specimen of ore from the O'Daly's Mine, on Vegetable Creek, looks like coarsely powdered specular iron ore. Some specimens of "Toads Eye" or cassiterite, which is striped like agate, are exhibited from Grenfell.

A number of smelting works, for reducing the tin ores, have been erected in New South Wales during the past four years. Several of the works have sent very creditable specimens of the metal which they make to the Exhibition. One of these, the Australian Tin Smelting Company, of Sidney, exhibit 40 large, and 9 small ingots of block tin, and also a quantity cast in small bars. To illustrate the purity of the metal which they make, they also exhibit a quantity of "grain tin" made from the same ores as produced the ingots. The mine from which the ores were taken, is that belonging to MOORE & Co., on Vegetable Creek. The St. Leonards Smelting Company exhibit an ingot of tin from their works, which it is claimed has been found to contain 99.9 per cent. of metallic tin. Some specimens of crystallized and grain tin are shown by the Pyrmont Tin Smelting Works of Sidney.

The following table shows the amount of tin made, and tin ore mined in New South Wales, of which any account has been kept. Much ore which has been raised by parties working in a small way, is not contained in this table. It will be noticed how rapidly the production of the tin has increased from year to year :

Year.	Tin Ingots.		Tin Ores.		Total Value.
	Quantity.	Value.	Quantity.	Value.	
	Tons.		Tons.		
1872.	47	£6,482	848	£41,221	£47,703
1873.	904	107,795	3,635	226,641	334,436
1874.	4,104	366,189	2,118	118,133	484,322

The falling off in the yield of ore in 1874 is due to the occurrence of an extraordinary draught, which, by producing a scarcity of water, prevented the mines from being worked. The tin of that year was made in part from the ore won in 1873 and 1874, in New South Wales, and also from ores brought from the other tin-producing colonies of Australia.

VICTORIA TIN.

The most important tin-bearing district of Victoria lies in the north-eastern part of the colony, and has the town of Beechworth for a center. One specimen of the ore sent to the Exhibition is taken from a lode in the Woolshed range of mountains, at a point about four miles from Beechworth. The ore occurs in a granular quartz, which is interspersed with grains of mica. A specimen of stream tin from the same locality is said to assay 78 per cent. of metallic tin. The occurrence of titaniferous iron sand and schorl with the ore, however, generally reduces the percentage of tin when sent to market to about 50 per cent. A number of specimens of dressed tin ore, some fine and some coarse, are exhibited from the Koetong District. The occurrence of these stream tins in Victoria is quite similar to those found in the other Australian colonies, much having been found at the surface in the beds of existing streams, while in one case the ore has been mined in tertiary drifts 230 feet below the surface. 290 tons 2 cwt. of tin ore was raised in the Beechworth District in 1874, which varied in value from 30 to 46 pounds sterling per ton. Up to 1874 there has been exported from Victoria 4,006 tons 12 cwt. of tin ore, and during 1874, 112 tons 14 cwt.

The smelting of tin ores is carried on at a number of works in the colony. In the Ovens District, which lies to the west of Beechworth, there are five of these works, two of which are operated by Chinese. With regard to the quality of the tin made, it is found in general that it mixes with lead in the proportion of 100 parts to 104-5 to form a good solder, while that made in England can only be used with lead in equal proportion. Some complaint has been made that the tin refined by the Victoria smelters, is not well adapted for mixing with lead, and it has been found profitable to have it refined a second time in England before being used. The tin made by the Chinese smelters is, however, very highly spoken of, and is said to equal the best "Straits" in quality. The shipments of metallic tin up to January 1, 1874, have amounted to 248,960 lb., and during the year 1874, to 86,016 lb. It sells in Melbourne at from 19 to 25 cents (gold,) a pound.

TASMANIAN TIN.

Very valuable deposits of tin ores have been found on this island, so that at present the production of this metal forms the most important metallurgical industry of the colony. The tin ores are found in a number of districts in the northern part of the island, the most important of which are those of Mt. Bischoff and Mt. Cameron. Mt. Bischoff is a mountain near the head waters of the Arthur River, which flows into the ocean near the northern end of the west side of the island. The ore occurs in large dykes of eurite or quartz porphyry, which traverse the slate and sandstone rocks, of which the mountain is composed. Disseminated through this porphyritic rock, the ore is generally found in small grains or strings, sometimes, however, occurring in large masses, one of which weighed over a ton. Some specimens of this ore which are exhibited by the Mt. Bischoff Mining Company, have a porous or vesiculated structure, which looks superficially like many limonite iron ores. They contain, however, from 65 to 70 per cent. of tin, the only impurity being a small amount of oxide of iron. The tin, in consequence, which is smelted from it, is as pure as any made. Stream tin, which has resulted from the decomposition of the lodes, is found in large quantities in alluvial drifts at the base of Mt. Bischoff. The drift material is identical in composition with the mass of the lodes on top of the mountain. The Mt. Bischoff Mining Company have sent a pile of tin ingots from their smelting works at Launceston.

SOUTH AFRICAN DIAMONDS.

THE first diamond was found in March, 1867, and on examining its physical character, it was pronounced by Dr. ATHERSTONE to be genuine. When this stone was received in London it created a good deal of interest, but also suspicion, some persons having asserted that it was brought forward for mercenary purposes; letters even appeared in the public papers implying that it was impossible it could have been found near Cape Town.

The late Mr. MAWE, who wrote on diamonds, and described their mode of occurrence in his travels in Brazil (London, 1812), often spoke of the probability of their existence in South Africa, and said that if people only knew them in the natural state he felt confident they would be found.

The number and quality of diamonds from the Cape are equal to those from the Brazils, which have chiefly supplied Europe during the last eighty years.

About ten per cent. of the Cape diamonds may be taken as those of the first quality, fifteen per cent. of the second, twenty per cent. of the third; the remainder, under the name of *boot*, are employed for cutting-diamonds, and for the numerous applications to which this valuable substance is applied on the part of the glazier, the engineer for drilling rocks, the lapidary, and others. Many diamonds contain specks and cavities; these are placed in the hands of skilled workmen who are acquainted with the cleavage, and by careful manipulation they often get out portions of the first quality for making small "brilliants," "roses," and "tables."

The cutting and polishing of diamonds was carried on in London with great success 200 years ago; after it was carried on chiefly in Holland. Attempts have been made to re-establish the trade in this country.

In 1874 the Turners' Company offered prizes in the form of medals and the freedom of the City of London. The Baroness Burdett-Coutts has supplemented this by the addition of money prizes, and has offered to contribute the further sum of £50 for prizes in the year 1876.

It is estimated that the value of the diamonds found at the Cape from March, 1867, to December 31, 1875, exceeds twelve millions of pounds sterling.

COAL WASHING IN ILLINOIS.*

By E. D. Meier, M. E.

ALTHOUGH "*practical*" men had tried to coke Illinois coals, from mines in the vicinity of Belleville and further east, and declared against its possibility on account of the presence of agents and circumstances alike unknown to chemical and engineering science, the knowledge of the success met with by certain "benighted" and, we must suppose, "*not practical*" men in Belgium, Germany, and Bohemia in washing or concentrating impure coals and then coking them, induced several capitalists of St. Louis to embark in an enterprise of this nature early in 1870.

Sundry specimens of lump and nut coal from mines on the Pittsburg Railroad were sent to Cologne, Germany, there ground and sized, then washed on the Osterspey jig, and afterwards coked at the gas works there. The gas was found to be very good, and the coke sufficiently pure for blast or cupola furnace use. The sizing had been perfect and the washing double in each case. The results averaged as follows :

Lump coal:	crushed	13·94 per cent. ash, 4·4 per cent. sulphur,	Washed 6 per cent. ash
Nut coal:	"	15·57 per cent. ash, 2·99 per cent. sulphur,	and 1·4 per cent. sulphur,

with a loss of from 35 to 40 per cent. in washing. The coke from this averaged 10 per cent. ash and 1·02 per cent. sulphur, and showed a coking loss of 40 per cent. This quantity, 60 to 65 per cent. of washed coal out of the crude mass, was considered possible only when arrangements were made for re-crushing and then re-washing the middlings. The consumption of water was not given. Nearly 25 per cent. of all the sulphur was found to be in the dust under 0·04 inch. Five analyses of as many different kinds of coke much used in iron smelting in Westphalia were added, running from 9·8 to 12·7 per cent. ash and 1·3 to 2·19 per cent. sulphur, and the desirable limits for good coke given as 12 per cent. ash and 1·75 per cent. sulphur, which is somewhat lower in ash but higher in sulphur than the average of the Ohio River cokes coming to this market.

An expert was summoned from Germany who put up washing works and ovens, the machinery being largely imported from there. Unfortunately, his knowledge of coal washing was merely practical, and having no scientific knowledge of the subject, he naturally followed Westphalian precedents without making any allowances for the great differences between the German coals and ours in chemical constitution and mechanical structure. A second superintendent achieved but little better success, and in 1872 Mr. J. W. MEIER and the writer were called in as consulting engineers, and in 1873 took charge of the works.

We found no records of any determinations of specific gravity, chemical assays, or even mechanical separation of the crude coal into its component parts. A few ash tests soon showed that the washing was very imperfect and irregular, the washed coal averaging as high as 13·35 per cent. ash.

In the consideration of the problem before us, we had first to deduce, from the theory of washing or concentrating by utilizing differences in specific gravity, certain general rules which all concentrators must follow, viz.:

First. The crude products should be crushed just enough to make a mechanical separation of the different components possible, to prevent large flat pieces of the lighter materials from floating small pieces of the heavier.

Second.—The crushing should be so arranged as to break the materials into grains whose three dimensions shall be nearly equal, *i.e.*, that should be tolerably regular polyhedrons.

Third.—Sizing—*i.e.*, separation according to size of grain, by means of screening, should precede the washing or concentrating.

Fourth.—Suction *must* be prevented in the jigs, as it interferes with the action of specific gravity.

This last would seem so self-evident that I should lose no words about it were it not that there are jigs manufactured to this day whose action is made to depend largely upon suction, *i.e.*, upon the pressure of the atmosphere upon the surface of the mineral to be concentrated.

To illustrate let us consider two very simple problems :

1st. We are to separate pyrites of 4·9 specific gravity from coal of 1·29 specific gravity, water being the unit.

2d. To separate galena of 7.4 specific gravity from limestone of 3·18 specific gravity.

Allow 6 inches for height of discharge or overflow. On one square inch of surface on grating or screen bottom *g* we would have a pressure

In Case I.		In Case II.	
Pyrites	1·05 lb.	Galena	1·60 lb
Coal	0·28 lb.	Limestone	0·69 lb.

Deducting from each 0·22 for water leaves as net pressure

Pyrites	0·83 lb.= 100 per cent.	Galena	1·38 lb.=100 per cent.
Coal	0.06 lb.=7·23 "	Limestone	0·4 lb. = 34 "
A useful difference of	92.77 "	and	66 "

Enough to make coal rise above pyrites, and limestones above galena. But now *add* the atmospheric pressure when you introduce *suction*, even calling it imperfect, and allowing only 10 lb. instead of 15 lb. we have

In Case I		In Case II.	
Pyrites	10·83 lb.=100 per cent.	Galena	11·38 lb.=100 per cent.
Coal	10·06 lb.= 93 "	Limestone	10·47 lb.= 92 "
A useful difference of	7 "	and	8 "

which leaves it somewhat doubtful if the lighter will rise above the heavier against the atmospheric pressure thus injudiciously introduced into the problem.

These illustrations are from easy problems, but how could such a jig act with such slight differences as 1·29 specific gravity for coal and 1·93 for bituminous shale, where in the natural state of affairs the useful difference is 71·4 per cent. and with suction introduced only 1·5 per cent.

To purposely bring this atmospheric pressure into a process depending upon specific gravity for its accuracy is an idea worthy of the man who built the syphon to carry the back water from his turbine up into his mill-pond in times of drought.

In spite of the rules above given we shall still have middlings or mixed products to deal with. These are caused by chance adhesions of small pieces of the different components, thus forming single grains of average specific gravity. These must be again crushed, sized, and jigged, and then with those quantities which will always crush finer than intended, make up so large a proportion of the total as to make the proper adjustment of the crushers or rolls a matter of serious moment. For, as will be shown, a jig as well as a screening drum can do more on large than on fine grain, other things being equal. For a screening drum this is too obvious to require explanation.

For a jig where the wave corresponds in height to the size of grain, a layer 0·2 inch high carried over would contain 4 times the material of 0·1 inch high, for the unit of width This is modified by the fact that small grains pack closer together than large ones, and that as we decrease the stroke we use more strokes per minute.

The Osterspey jig, which we found in use at the coke works, was invented by Mr PETER OSTERSPEY, of Mechernich, in Rhenish Prussia,† and is there run on lead ores of from 1½ millimeter to 10 millimeters, or from 0·06 inch to 0·40 inch grain. They wash on these machines 1½ million cubic feet of ores per month, some of it being enriched from 1·8 per cent. to 70 per cent. lead.

The product averages about 300 cwt. per hour per jig of 22 inches width, the water consumption is 1 cubic foot per minute, equivalent to 0·35 gallons per inch width per minute.

Mr. OSTERSPEY gives 200 cwt. per hour for 4 millimeters=0·16 inch grain, and 350 cwt. for 10 millimeters = 0·40 inch grain.

A coal somewhat similar to the Belleville coal is found in the Saarbrücken district of Rhenish Prussia, and we had examined the works there with a view to adaptation of methods and machinery to our coals. The best conducted works there used separating or sizing drums before jigging, though they had few kinds of impurities to deal with, their coals were richer in fixed carbon than ours, and a reduction of the percentage of ash from 19 to 9 suffices to make a merchantable coke.

The loss in washing was variously given as 12, 14, and as high 24 per cent. The impurities were easily separated, being much heavier than the coal, and none containing excessive percentages of ash, so that occasional inaccurate work would not show very badly in the day's total washing. Moreover the sulphur was all in pyrites, in tangible lumps, and not in flakes and thin lamellæ as in our coals, and there was very little, if any, fireclay in the slack. Above all, the coal naturally breaks into nearly cubical fragments, making the crushing easy and the amount of dust small. In my judgment, the washing loss should not run over 15 per cent. in well-managed works there. In structure the coal has much thicker layers than ours, the laminæ averaging about one inch in thickness. Hence one inch was the maximum size of grain washed, giving, of course, very good results as to quantity. The totals varied from 143 lb. to 230 lb. of crude coal washed per hour per inch of width of discharge side, the average being 197 lb., *i. e.*, on grains running from about 0·1 inch to one inch, generally classed in four sizes.

The consumption of water was from 0·39 gallon to 0·76 gallon per inch per minute. All the more modern jigs discharged the coal over a bridge of the full width of the machine, and as far as possible from the feed hopper. The slate or dross discharges were various, some having full width, and some having two round openings with plugs near the front. Had the dross been as much in quantity as in our coals, the latter would have been necessarily almost constantly open, causing much larger consumption of water.

With these data before us, we determined to make our improvements one at a time, testing the value of each before proceeding with another. The first step was to determine the precise nature of our problem.

We found the Illinois coal composed of six distinct components in mechanical admixture, easy to be distinguished and separated by eye and hand, with different specific gravities, as follows :

Good coal	1·29	specific gravity.	3 to 5 per cent. ash.
Bituminous shale	1·93	" "	72·25 " " "
Fireclay	about 2·20	" "	
Calcspar	2·70	" "	
Pyrites	4·99	" "	
Slates	about 2·67	" "	

The bituminous shale contains a great deal of fine illuminating gas, and is hence useful in boiler coal, but its excessive percentage of ash shows it very injurious in coke, while its small specific gravity makes it difficult to separate it from the pure coal.

The calcspar reveals its presence so plainly as to make it easy to deal with. The fireclay is a difficult body to treat, owing to its clogging the meshes of screens, choking elevator buckets, and settling in a film over the washed coal. The flakey structure of many of the impurities makes suction an enemy almost certain to defeat accurate washing.

The coal consisting of thin laminæ threw the washing of 1 inch grain out of the question, as high as 0·5 inch being first attempted, but a reduction to 0·42 inch as the maximum became necessary ; this, of course, reduced the quantity produced in greater ratio than it improved the quality.

A jig whose action is very uniform, and not liable to derangement while discharging the dross, was indispensable. Fortunately the Osterspey jig has all these good qualities. Certain improvements in its construction became necessary to adapt it to its work on Belleville coal, until it assumed the shape here given. The upper box AB is composed of 2 inch plank, feathered at the joints and bolted to a stout bottom frame of 4×8 inches scantling, and an upper frame of 3×6 inches. The bottom frame serves to rest it on floor timbers, either lengthwise or crosswise as most convenient. The lower box C, also of 2-inch plank, fits into it, secured by heavy feathers and bolts. It is pointed toward the bottom to cause the fireclay, etc., to settle around the mud-valve M, through which it is discharged.

The upper box has a rear chamber B, with plunger, P, and is separated from the forward chamber A, with screen bottom, *gg*, by means of the diaphragm E. This is double, and admits the water supply-pipe *w*, and the mud valve rod *r*, both of which pass through the cross-plate *e*, which forms a fulcrum for the mud valve lever, *m*, and a support for the housings H, carrying the two shafts. The forward shaft carries a pulley, S, and a slotted crosshead, T, in which a tee-headed bolt I, is clamped at a point giving the desired stroke. A sleeve on the bolt I, works in boxes sliding freely on the guides G, attached to the rear shaft, thus giving a quick down-stroke, and slow up-stroke to the crank K, and the plunger P.

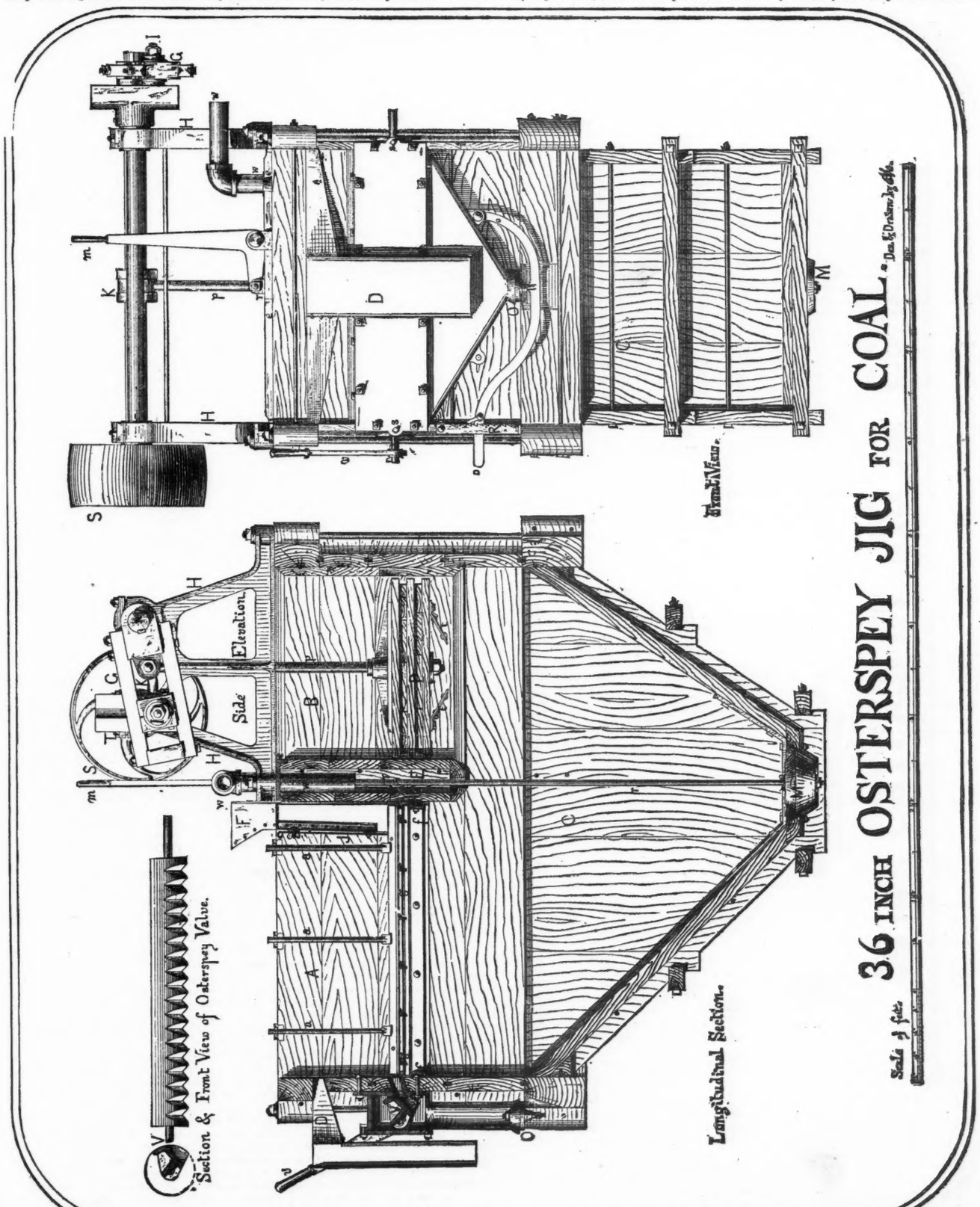
The bed *q*, is made of fine wire cloth, supported on coarser netting, or on perforated plates of iron braced by six small angle irons crosswise, and two heavier ones lengthwise, held down by key bolts, *aa*, and resting on a narrow cast-iron frame *ff*. By driving back the keys and unshipping the six bolts, *aa*, the whole bed can be lifted out and replaced in ten minutes. By having a few extra bed-screens on hand, we avoid delays, in case of choking up by fireclay, or in case of repairs to screens.

The screen-plates perforated with fine holes in use in Europe will not answer, frequently choking up with fireclay several times a day.

*A Paper read before the Engineers' Club of St. Louis, Mo., June 10th, 1876.

†This jig was patented November 2, 1869, by ADOLPHUS MEIER & Co., St. Louis, Mo.

The coal is fed through a hopper, F, and under the slide, J, which regulates the quantity. It is jigged along the whole length of the screen, *g*, the washed coal discharging over the bridge through the hopper D. The slates and dross pass through a slot flush with the bed-screen, and through the valve, V, and drop into a pocket, from which they are occasionally drawn by means of the slate valve O. The main valve V, consists of part of the periphery of a cylindrical roller, which has been perforated by a number of parallel triangular prisms. This presents to the discharge slot a number of triangular openings, giving, equally distributed over its entire width, just as much free area as is required to continuously discharge the dross as it accumulates on the bed *g*. When it becomes necessary to open the valve O, the valve V is momentarily closed by turning the lever *v*, until V presents its smooth cylindrical surface to the discharge slot. Then O is thrown suddenly open, the dross washes out, O is as rapidly closed, and V slowly returned to the position previously determined as giving the required discharge area. The plunger has valves *tt*, of such opening as to prevent any possibility of suction. The feed-pipe *w*, supplies water when needed to fill the jig, or to supply the waste when V is closed and O open. The value of having the lower discharge as far as possible from the feed, and



of the full width of the screen, whether in washing coal or concentrating ores, will appear upon reflection, and can be shown by ocular demonstration when working a jig.

A certain number of strokes will be necessary to create regular layers of materials of different gravities. Within certain limits this classification must be improved with each stroke. These layers will, in uniform action of the upward currents of water, be of equal thickness across the jig, *i. e.*, perpendicular to the line of travel. The lower or heavier ones, as well as the upper or lighter ones, should be removed without disturbing that equilibrium which has been so carefully established, and which is expressed in their uniform thickness. Hence they should be removed on the side opposite the feed hopper, and in even layers of the *full* width above as below. The overflow over the bridge is regulated in this sense by the regular parallel waves, the discharge through the Osterspey valve is of as constant thickness, and is evenly distributed over the whole width of the front.

I have frequently verified this by taking up sections of material of the whole height of the mass, at equal distances on lines parallel to the front, and spreading them on a board. Until the hands were skilled by long practice, this was their means of gauging the correctness of their work, and of determining how often to blow off at O.

When either discharge is made through narrow channels or tubes, either a thickening up of the separate layers must be assumed, or parts of other layers must become mixed with those ready to discharge, causing inaccurate work. The latter is by far the more probable supposition to any one familiar with hydraulics.

To return to our special problem. For sizing, we found a so-called "Stufenretter" on hand, *i. e.*, a series of rectangular screens shaken in a horizontal sense by cam motion. This gave three products holding in the crude and in the washed state respectively:

Size 1 crude	19·9 per cent. ash.	Washed	11·5 per cent. ash.
" 2 "	16·7 " " "	"	10·2 " " "
" 3 "	25·2 " " "	"	17·0 " " "

The average being as before stated, 13·35 per cent. in the washed product.

As this did not remove the dust at all, frequently choked up, and sized imperfectly, we removed it and put in first a dust drum, removing everything below 1-10th inch as dust amounting to 13·8 per cent. of the whole mass, and holding 26 per cent. ash, the 86·2 per cent. remaining holding only 17 per cent. ash, out of slack varying from 18 to 22 per cent. ash. The washed product showed only 11·2 per cent. ash average.

The next move was to put in a large classifying drum. To simplify naming sizes of grain, I will give them hereafter only in hundredths of an inch, and indicate by the dimensions of the meshes of the screens between which they fall. Thus 10 > 20 represents that the grain was between 10 and 20 hundredths of an inch in dimension. Our sizing drum gave us four sizes:

I.—10 > 20	having	7·25	per cent.	ash	when	washed.	
II.—20 > 30	"	8·25	"	"	"	"	"
III.—30 > 42	"	9·57	"	"	"	"	"
IV.—42 > 50	"	8·53	"	"	"	"	"

The average from the bins being 9·05 per cent.

The height of bridge or overflow was only 4½ inches, as is proper for lead ores. We commenced raising this with the following results, on size III., using double washing:

Bridge,	4¼	inches	high	9·27	per cent.	ash.
"	6	"	"	8·37	"	"
"	8¼	"	"	7·67	"	"
"	9	"	"	7·00	"	"

On larger grains we found 10 inches a safer height.

After some months we found it necessary to abandon our largest size, and having put in enough jigs to meet the deficiency sure to arise in the quantity, we arranged to wash between 1-16 inch and 1·42 inch, at the same time, in consequence of further experiments, adopting double washing for *all* sizes. Our four sizes now were:

I.—6 > 10. II.—10 > 20. III.—20 > 30. IV.—30 > 42

and our average result the ash reduced down to 5½ or 6½ per cent.

Everything over 0·42 inch was first passed through a coarse jig, and there recrushed, sized, and sent to the jigs. The following table will show the effect of each improvement on the average result:

Recapitulation.	Percentage of ash.	Total reduction in percentage of ash.
Slack coal as received	18 to 22	
After passing dust drum	16·5 to 17·5	
A reduction of	1·5 to 4·5	1·5 to 4·5
After *single* washing *without* sizing	11·2	
A further reduction of	5·3 to 6·3	6·8 to 10·8
After *single* washing *with* sizing	9·0	
A further reduction of	2·2	9·0 to 13·0
After *double* washing *with* sizing	5·5 to 7·0	
A further reduction of	2·0 to 3·5	12·5 to 15·0

Or, say in round numbers, we reduced the percentage of ash from 20 to 6; this is accomplished with a loss of 34 per cent. in weight, *i. e.*, 100 lb. slack furnish 66 lb. washed coal, having respectively 20 and 6 per cent. ash. Hence in these 66 lb. of washed coal there are 4 lb. of ash, leaving in the 34 lb. lost 16 lb. ash; *i. e.*, the dross discarded has 47 per cent. ash, and holds most of the sulphur in the original mass. This is a better result than that of the original German experiments, since it is obtained without saving the middlings. We refrained from this, as it would give us too much fine grain, which is difficult to treat on a jig. We are now experimenting with a syphon washer on stuff as small as 0·03 of an inch; the results I hope in a few weeks to be able to give you.

One word more as to quantity. Keeping in certain limits as to quality, the quantity is also limited. You can easily double or treble it by relaxing those limits, but where two per cent. of ash added may add nearly one per cent. of sulphur, as in Belleville coal, it is not permissable. The quantities washed, preserving the quality above given, varied from 30 lb. for the smallest size I., to 223 lb. for size IV., per hour, per inch of width, the total capacity being 21,200 lb. slack per hour. On Pennsylvania coal the same machinery could easily furnish 60,000 lb. per hour. Hereafter, No. I. will be thrown on syphon machines, and numbers II., III., and IV. sub-divided to make six sizes. We believe the greater accuracy and regularity of the work will soon pay for the expense of the extra screens. Our No. IV. being about a middle size in the Saarbrücken classification, we can fairly claim to have reached the average in quantity there observed, while the washing is closer and more accurate under more difficult circumstances.

ENDURANCE OF IRON RAILS.*

By W. E. C. Coxe, Reading, Pa.

IN 1857 the Philadelphia and Reading Railroad Company, whose main line extended from Philadelphia to Pottsville, Pennsylvania, with branches into the coal regions of Schuylkill County, made a contract with the Fairmount Rolling Mill at Philadelphia, for the re-rolling of some four thousand tons of iron rails. The essential features of the agreement were that the old rails should be piled with puddled iron, and rolled into flats for the rail pile, which latter was to be of a section seven inches square, and after being heated and reduced by rolling to a bloom of a section about five inches by six inches, was to be re-heated, before being finished into the rail of the **T** pattern, four inches high, weighing sixty-four pounds per yard. Great care was exercised in the execution of this contract, and the rails being distributed over all parts of the road, gave general satisfaction by their excellent wear. Five years afterward, the principal proprietor and manager of the Fairmount Rolling Mill was elected President of the Reading Railroad, and very many of the rails made under his supervision were still in use in the tracks of the company, of which he had just assumed the management. His first efforts were, therefore, directed to the procuring of more rails of the same quality wherewith to replace those worn out: here he encountered some trouble, makers refusing to bid because of the details in the specification; the required re-heating being the objectionable feature, for which it was generally intimated they would not be sufficiently remunerated for the increased labor, extra coal consumed, and the changes necessary from the established methods of working. Most of the new rails were, therefore, bought, and the old rails re-rolled without regard to any particulars as to the manner of piling, heating, etc., each manufacturer furnishing what he deemed the best article possible for the money. As a consequence, rails of all imaginable grades were placed in the track, some giving out in six weeks under a heavy traffic, the majority inside of a year, and very few lasting over two or three years.

So great was the dissatisfaction with the character of the iron rails the company were able to obtain, that in the latter part of 1866 they determined to erect a rolling mill and manufacture for themselves. Bessemer steel rails were then coming into this country from England in small quantities, at very high prices, and their use at that time was questionable; but their introduction was considered, and in planning for the mill, engines and trains were adopted of sufficient size and strength for the rolling of steel. Ground was broken at Reading in the Spring of 1867, and the first rail turned out in March, 1868.

It was the intention, from the inception of this project, to make a rail of the very first quality, and whilst it was not believed they could be made for any less cost than the market price of an ordinary rail, the profit or gain was in the enhanced endurance of the product. The result has fully justified the wisdom of the policy, and the expenditure for the plant has been more than returned to them, directly by the dollars saved in being their own manufacturers, instead of purchasing from outsiders, and, indirectly, which is of paramount importance in the longevity of the rail, requiring less frequent renewals of the tracks, and, of course, a reduction in the expenses for repairs. The Reading Railroad, at the expiration of 1875, owned, leased, and controlled 1,550 miles of tracks and sidings. The transportation department requires, for its business, 404 locomotive engines, some of them weighing 38 gross tons, and the majority 30 tons; 14,975 eight and four-wheeled coal cars, equivalent to 22,740 four-wheeled cars; 3,520 eight-wheeled, and 328 four-wheeled freight cars, and 310 passenger cars.

In addition, the Roadway Department has in use for construction and repairs, 687 4-wheeled cars. The class of traffic is peculiar, about 60 per cent. being coal, 34 per cent. freight, and but 6 per cent. passengers. The nature of the trade being especially destructive to the permanent way. The rolling mill constructed by the company consists of 12 single puddling furnaces, with a yearly capacity of 6,500 tons of puddled bars; 8 heating furnaces, and 2 re-heating furnaces, capable of furnishing, in the manner hereafter mentioned, 20,000 gross tons of finished rails annually. It is more especially a re-rolling mill. The method adopted for making the rails was to work about two-thirds old rails with one-third new or puddled iron. Three pieces of old rails are piled on two layers of puddled iron, as shown by Fig. 3, and heated and rolled into 3 and 4½ inches×1 inch flats, these form the body of the pile, Fig. 4, being piled so as to break joints, 7 inches high. The head piece is rolled from a 9-inch square pile of these same flats, Fig. 2, heated and rolled into a slab 9 inches wide by two inches thick, forming about 22 per cent. of the whole pile. The rail pile thus made up to a section 9 inches square is rolled in three high 23-inch rolls, until reduced, in six passes, to a bloom 7 inches wide on the base, 5 inches high, and 5 inches wide on the top; the bloom would somewhat naturally assume this shape in course of reduction, but it was more particularly given to distinguish the head part of the bloom from the flange. The bloom is then carried hot to a re-heating furnace, and wash heated, preparatory to the final rolling to the finished rail, which is done on a two high, 23-inch train, in six passes; a total of 12 passes from the 9-inch pile to the rail 4½ inches high. The use of the puddled iron with the old rails, prevents the dryness inherent generally in reworked iron, and insures, with the wash heating, better welds. The bloom is kept in the reheating furnace sufficient time, say 15 minutes, to bring it up to a good welding heat. The bloom going quite hot to the finishing rolls is very completely welded in the first three passes, and as the rolling is done in one direction only, the rolls being too high, it is believed the cinder is nearly all expelled, instead of being retained to some extent by being chased backward and forward, as would likely be done by rolling in both directions on three high rolls.

After the bloom is thoroughly cemented, the cinder being no longer essential, it is well not to retain it in the rail. It is very evident in the rolling on the two high train, that the rail comes from the last or finishing pass colder than it would if rolled on the three high rolls, from the fact of more time being required for the rolling, in carrying over the rolls, instead of passing through a groove, and thus considerable heat is lost. The colder the rail is rolled in the last few passes, the denser and harder will be the metal. In this way an extremely sound rail is obtained, with a good wearing surface.

All the rails are stamped or embossed with the year of their manufacture, and as they are placed in the tracks, the month is also stamped upon them. No old rails are sold by the company, but when worn out or used up returned at once to the mill, and from the stamp upon each rail we get the date of its birth, and knowing the time of death from its return, we can compute the life of the rail. In the annual reports of the President of the Reading Railroad since 1868, will be seen a statement of the wear of the rails manufactured by

* A Paper read before the American Institute of Mining Engineers at the Philadelphia Meeting, June, 1876.

the company. From this we learn that out of 9,000 tons of rails made and placed in the tracks in 1868, the first year the rolling mill was operated, only 4,500 tons, or 50 per cent., had been returned at the close of 1875 as worn out, leaving 50 per cent. as still in use. In 1869, the second year, 17.000 tons were rolled and put in the road, out of which but 4,000 tons, or 24 per cent., have been condemned as used up, and returned for re-rolling, leaving 76 per cent. still in use.

As it is probable that some of the first two year's make, although too much worn to be of service in the main tracks, were sufficiently good to be placed in the s dings, instead of being sent back to the mill, no estimate is made of the tonnage carried, but, passing to the third year, 1870, the product being 17,-500 tons, we find only 3,000 tons, or 17 per cent., have been condemned as worn out, and taken from the tracks, leaving 83 per cent. of that year's make still doing service after six year's use, having carried some 50,000,000 gross tons, inclusive of weight of engines and cars. It should here be stated that, at the expiration of the year just mentioned, the weight of the rail was increased from 64 to 68 lb. per yard, more metal being put in tha head, with the expectation of making it still more lasting. The product of 1871 was 19,000 tons, 92 per cent. of which can now be found in tolerable condition after having borne 5 year's traffic ; and of the product, 20,000 tons, of 1872, only 6½ per cent. have been worn out, under a tonnage of 35,000,000.

Since 1872 the make has averaged 15,000 tons per annum, but owing to the remarkable endurance of the rails previously made, all the new rails manufactured in 1873, 1874, and 1875, have not been laid in the track, and the percentages of the removals are not quite as accurate as those already mentioned. This generally would seem to show the uniform excellence and durability of the rails turned out by the process described. Late in 1869 it was decided to make some particular tests of rails manufactured in the usual way, with the exception of leaving the old rails out of the head piece, and substituting some special brands of pig iron, worked alone for this purpose. In January, 1870, these rails were placed in the down track of the main line, above Reading, near the rolling mill, where they would be required to carry most of the immense tonnage from the coal regions, and where they could be frequently observed by the writer, and their wear carefully noted. The method of making these rails will now be described. Referring to the sketch (which shows the sections full size), Fig. 1 represents a pile made from muck bars, puddled against soapstone compressed in the rotary squeezer, and rolled into flats 4½ and 3½ by ⅞ inches, and piled, breaking joints, 8 inches wide by six inches high ; this is rolled into flats 4½ and 3×1 inches, and formed into a pile of a section 9 inches square, as shown in Fig. 2 ; some of these piles were rolled flat or horizontally and others on edge, or vertically, into head pieces or tops 9 inches wide by 2 inches thick. The body of the rail pile, Fig. 4, is made up of 4½ and 3×1 inch flats, rolled from a pile of three pieces of old rails, and four pieces puddled iron, as shown in Fig. 3. The rail pile (Fig 4) thus made up of a section 9 inches square is rolled into a bloom (Fig. 5) 7 inches at base, 4 inches on top, and 6 inches high, with the head at the top, and charged into a reheating furnace and wash heated before final rolling in the two-high rolls to the rail section (Fig. 6). The rolling of some of the piles for the heads (Fig. 2) on edge, so as to bring the welds vertical, instead of horizontal, in the finished rail, was for the purpose of comparing the two methods. In the horizontal piling most of the failures arise from lamination. The best results followed from the edge rolling. The welds, although vertical, in the heads of the finished rails are in practice rolled horizontal, from the manner of the rail going through the last three passes on its side, the vertical pressure more thoroughly welding the head. Twelve varieties of pig iron were selected for trial, 9 from the Schuylkill Valley, 2 from the Lehigh, and 1 from the Susquehanna. Pieces were taken from the different kinds after being puddled, and once reworked, and tested for tensile strength. The maximum being 66,000 lb., and the minimum 45,000 lb. to the square inch. They were divided into three classes : The neutral irons with tendency to cold shortness gave an average tensile strength of 63,200 lb. ; the red short, 60,700 lb. ; and the cold short, 52,500 lb. These were again arranged in two lots, those with heads rolled flat, and those with heads rolled vertical, and the tonnage, including weights of engines and cars actually carried by each kind befo was worn out, was as follows :

	Rails with heads rolled flat.	Rails with heads rolled vertical.
Total average	25,324,348 tons.	30,040,670 tons.
Red short average	26,959,808 "	22,819,300 "
Neutral average	22,412,593 "	28,789,361 "
Cold short average	26,645,538 "	33,472,600 "

From this we gather that the cold short irons rolled on edge show on the average the most endurance. The parcel of rails doing the best was removed after six years of service, during which time 55,000,000 tons passed over them. One of these rails carried over 56,000,000 tons and was taken from the tracks, before being absolutely worked out, to be placed on exhibition at the Centennial Exposition. The hard, fine grained, cold short irons are more durable than the softer, and stronger, fibrous irons of a red short nature. The cold short irons appear to give the best welds, and the stronger they are the better. The irons in the heads of the rails bearing the maximum tonnage was from a blast furnace in the vicinity of Reading, and was smelted from a mixture of 60 per cent. East Penn hematites, 25 per cent. Tilly Foster, and 15 per cent. East Penn magnetic ores. The analysis of this head iron gave

Phosphorus	·422
Silica	·392
Sulphur	·032
Manganese	·164
Carbon	·027
Iron	98·963
	100·000

In the same track with these experimental bars were laid some rails with the heads formed of a solid hammered charcoal bloom with the expectation that, being without welds, they would show a wear almost equal to steel ; but they gave out under a tonnage of 28,000,000. As the iron was too soft from lack of sufficient rolling they mashed out in spots under the heavy traffic. Puddled steel headed rails have not done much better from the same causes. Some excellent results were obtained from steel headed rails made by welding Bessemer and open-hearth or the Siemens-Martin steel slabs on to an iron base, but as the purpose of this paper was to deal with iron rather than steel, inquiry in this line will not be extended further.

Fig.1

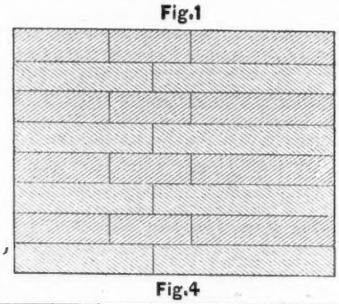


Fig.2

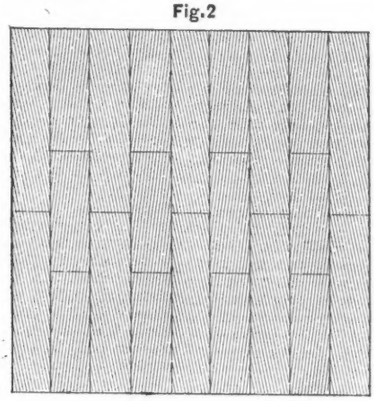


Fig.3

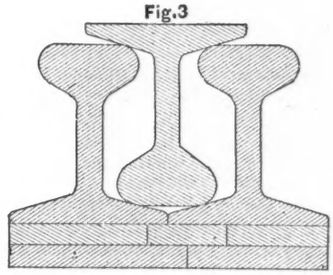


Fig.4

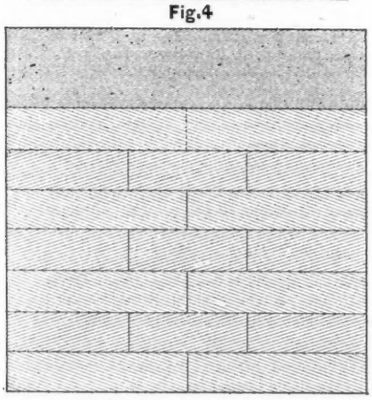


Fig.5

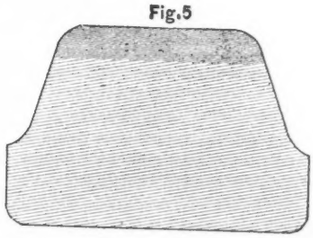


Fig.6

Whilst admitting the vast superiority of steel for rails required to stand a very heavy traffic, iron, if carefully selected and properly manufactured, has a capacity for which it seldom gets credit. At the present time it is possible to make iron rails by the method described at considerably less than the price of steel rails, and as a matter of economy it is of vast importance to roads with an ordinary traffic to consider whether they shall substitute steel for their old iron rails, disposing of the latter at a sacrifice, or have them re-rolled by the process adopted by the Philadelphia and Reading Railroad.

DISCUSSION.

Mr. HOLLEY asked if in regard to extending the cinder it was not equally important to roll the pile on a two-high mill as to make the finishing passes of the rail on the two-high mill.

Mr. COXE replied : It is better to retain some of the fluid cinder in the pile until after it has been bloomed and reheated, in order to perfect the weld. Rolling in the three-high in the earlier stages favors the retention of the cinder. Some of the cinder is of course thrown out in the first rolling on the three high, but enough is kept in to act as a cement when it comes to the two-high finishing rolls from the reheating furnace. We think we get the cinder very thoroughly expelled on the two-high mill, more so than on the three-high. We have also tried three-high rolling for the rail finishing. Some two years since we got up a set of three high rolls for rolling steel ingots. We put half of our furnaces on steel and half on iron. It is very noticeable in rolling iron on the three-high rolls that not so much cinder is expelled as on the two-high.

Mr. FIRMSTONE—Do the rails with vertieal welds in the head ever split down with a line in the neck?

Mr. COXE—This has not occurred since these experiments were made. We thicken the rail by building up underneath the head. thereby overcoming the difficulty. A glance at the diagrams will show that the head bar or cover does not run down to more than one-half of the thickness of the head of the rail; the vertical piled head bar being supported by the horizontal piled iron underneath.

In answer to a question whether cinder is not more effectually expelled by alternately rolling backwards and forwards, Mr. COXE remarked: The cinder must be expelled from the ends of the pile. This should be done in one direction, and the tendency of the cinder is then to flow and be ejected from one end. If the pile is reversed, or rolled in the opposite direction, the flow of a portion of the cinder is changed and forced to the other end, and thus some is retained in the middle.

DR. WEDDING—This is the reverse of our opinions and practice. The effect of rolling in one direction is to accumulate cinder at one end ot the pile, while reversing tends to its more even distribution and expulsion.

Mr. COXE—There is no doubt that there are more crop ends when rolling two-high than when rolling three-high, and the former is moreover much more severe on the iron. We are required in consequence to use a higher and better class of irons.

Mr. HOLLEY—Is it not the most important element in the manufacture of iron rails that plenty of work should be put on them?

Mr. COXE—Yes; the iron should be as much condensed as possible.

Mr. HOLLEY—Is it not possible to take inferior irons, and by the process you describe—reworking the iron frequently—to produce a very good rail?

Mr. COXE—I cannot tell; we have never used what we consider an inferior iron.

Mr. REESE agreed with Mr. COXE in the importance of selecting good iron. He had tried by repeated workings to counteract the original poor quality of an iron, but had generally failed. Careful selection of materials was essential in iron manufacture.

Mr. COXE—For the benefit of some of our friends present I would add that our high averages were obtained with irons from Glendon and Monocacy furnaces.

Mr. BRITTON.—I would like to refer briefly to some results of analyses made by me several years ago. In order to ascertain the constituents of good and bad rails, with a view to publication, I addressed notes to the Pennsylvania Railroad Company, the Philadelphia and Reading Railroad Company, and the Philadelphia, Wilmington and Baltimore Railroad Company, and in response obtained a number of samples (short sections) of rails that had been in actual use, the histories of which were known. They were of all qualities, good, bad, and indifferent. The first batch received was, according to my recollection, from the last named company. It included some of Welch rails, originally laid, I was told, in the track of the Frenchtown and New Castle road in Delaware. Some of these rails had been in use for about 28 years, and others for 32 years, and when eventually taken up, after several removals, and being no longer fit for use, were found to be not broken, cracked, split, or crushed, but worn out by abrasion merely; their tops were mostly smooth and their edges sharp. The iron in them was thought to be peculiar; it was supposed to be homogeneous; each rail, it was believed, had been rolled from a single billet. In order to test whether this last was the case or not, the ends of several of the samples were filed straight off and polished, and then dipped for a short time in dilute nitric acid, and upon removal were quickly washed, wiped dry, and oiled, when the piling of the metal was readily seen; the lines were fine and beautifully distinct; the welding was perfect. Of these samples one hundred and two analyses were made. The average amount of phosphorus found was about ·32, the carbon, ·06, a very little sulphur, and some silica due to slag; there would have been no silicon, I apprehend, after such repeated working as the iron must have had. Practically there were no other impurities. The top part and bo tom part of each sample was analyzed separately, there was some difference, but very little. Many of these Welsh rails, when taken up, were used, I was told, for making car-wheel axles and bridge rods, so good was the iron found to be. When I came to examine some of the other samples, I was very much surprised. Portions from the top, the neck, and bottom were separately analyzed. One sample from the Pennsylvania Railroad, if my recollection is correct, which claimed an excellent record, had upon the top a very cold-short-iron, made, it might have been, from cinder pig; in the neck, the constituents were quite different, indicating a bad iron, though tough; in the bottom, the constituents were again diflerent.

The examinations of the samples were numerous and laborious. The conclusions arrived at were that a very good rail may be made from several very bad irons, if properly arranged; that is to say, the top of the rail may be made of a hard, cold-short iron, which will give wearing quality, and the under part of the head, the neck, and flange, of irons of different qualities, but possessing toughness; yet each one in itself, for many purposes, may be worthless, and alone would be condemned for rail-making.

The speaker referred to some rails with beads of quite cold-short phosphoric iron made at Milwaukee, which wore well.

CAMBRIDGE COAL MINES IN GUERNSEY COUNTY, OHIO.

By Andrew Roy.

THE Cambridge coal has been named No. 6 by Dr. NEWBERRY, in the geological report. I am disposed to regard it as the equivalent of the great vein of Perry County, and the big vein of Salineville, which were each No. 6, but owing to the numerous seams of the coal field, their entire absence over large areas where they are due, their varying thickness, and their undulations, it is simply impossible, in the present state of mining developments, to classify, with absolute certainty, the coal beds.

This coal appears to occupy a limited area as a workable seam, five miles east of the Norris shaft, along the line of the Baltimore and Ohio Railroad, a shaft was sunk three years ago on the McCreery Farm, and no coal was found; and seven years ago another shaft was sunk at Campbell's Station, two miles east of the McCreery Farm, without tapping coal. West of the Guernsey Mine the seam has been opened in a number of places on both sides of the railroad, and has invariably been found too thin to work, and this, too, where the regular shale roof caps the coal. In these openings the bed is of varying thickness, sometimes rising to four feet, and thinning down to one or two feet, within the space of a few yards. The coal is always thickest at the out-drop, and gets thinner the further the entry is pushed under the hill.

Approaching Cambridge, the coal appears to be wanting altogether, or to be present as a mere trace, and where present, has a sandstone roof. In the tunnel west of the village, this sandstone has disappeared, and the coal is seen in the cut with a cover of gray shale; the seam is, however, very thin, scarcely rising to fifteen inches in height.

Two thin seams of coal lie above this bed, within ninety-five feet of it. They are both present at the air shaft of the Norris Mine. The lower of the two is one foot thick, and is sixty-five feet above the shaft cone, the upper one is ninety-five feet above the shaft cone, and crops out in the ravine on which the air shaft is sunk. This stratum has been opened at several points on the opposite side of Leatherwood Creek, eastward of the Norris shaft, and is a black coal of varying thickness, with a shale parting in the middle of it. It appears to be deposited on a very uneven floor, lying in hills and hollows, and to be subject to sudden changes in height, rising from six to twenty-six inches. This seam I regard as No. 7, the equivalent of the strip vein of Salineville, and of the coal of Tuscarawas County, which is there capped with the black band ore of that region. Six and a half miles east of Cambridge, at Anderson's, this coal is found from two to three feet thick in its finest development; it has been opened in several places, but it still occupies an irregular floor, rising and thinning out rapidly on the hill sides of the mine.

The mines opened on the main Cambridge coal all show, as in many other districts, a wavy and uneven floor. The average rise from the Norris shaft to Scott's Mine, is twelve feet in a distance of one mile. From Scott's to Fordyce's, a mile further west, the difference of level of the mouths of both mines is also twelve feet, while Robin's—only one-third of a mile west of Fordyce's—is twenty-five feet higher. At the village of Cambridge, three miles southwest of Robin's, the coal is lower than at Robin's, and this, too, in the line of direction of the rise of the strata. In the Tunnel, one-third of a mile west of Cambridge Station, it is still lower, being only fourteen feet above the level of the railroad track.

The dip of the coal is more rapid in some of the mines than in others, and is more marked in one division of the same mine than in another. In the Norris shaft, the dip to the south is such in the two upper east entries as to forbid the working of rooms to the south, as they would make water, while the first eastern entry rooms are worked to both north and south, the rooms rising to the south there. In Scott's Mine the main entry on the face of the coal dips to the south 17 feet, in a distance of 900 feet, and then commences rising. In Fordyce's Mines the coal rises to the south from the entrance of the mine for a distance of 600 feet. The same conditions prevail at the Robins' Mines as at Fordyce's, so that from the lowest places in Scott's to the highest places in Robins's, there is no less than 67 feet of a rise, the distance being only one and one-third miles.

Inequalities of level are also encountered in the Nickolson Mines, situated on the Marietta, Pittsburg, and Cleveland Railroad, but they are not quite as marked there. That these high and low places in the coal flaw of mines, are simply inequalities of level existing at the time of the deposition of the carbonaceous material from which the coal is derived, another proof is added by comparing the distance between the two coals in the Norris air shaft and hoisting shaft. In the air shaft they are sixty-five feet apart, while at the hoisting shaft they are but fifty-two feet apart, showing a convergence of the seams of thirteen feet in a distance of about 200 yards. The troughs and hills on which the upper one of the three coals alluded to reposes, the flow of the mine pitching in some places at least 20 degrees, has no counterpart in the seams immediately below.

The roof of the mines in numerous places is studded with the casts of trees, standing erect as they grew in the old coal forest. They do not, however, extend into the shale more than nine inches, when they suddenly stop short and cease. At this point there is a smooth or parting in the shale, and where the roof is not securely propped, this mass of slate falls down, and the tree casts above fall out. Frequently the casts above fall out, slipping away suddenly and without warning, and are a dangerous enemy to the miner. Alongside of these casts, the prostrate forms of the impressions of the trunks of the trees lie stretched full length in the roof, as they fill in the mud after the subsidence of the coal marsh. The rims of the erect stems are marked by a thin layer of bright short grained coal, which represents the bark of the trees. In no other coal region of the State are there seen so many of these stems on the roof of the mines. They are as numerous as the trees of a modern forest in some divisions of the mines.

The two thin seams of coal lying above the Cambridge main coal, as seen at the air shaft of the Norris Mine, have thinned out at the tunnel west of Cambridge. The cut on the west side of the tunnel lays bare the strata to a height of more than 100 feet. The fire-clay flows of both seams are present, each in its proper horizon, and the place of the coal is filled with shale with the merest trace of slaty coal resting on the fire-clay. There is nothing to indicate that the coal has been removed by denudation; it appears, rather, never to have been deposited. The causes of the dwarfing of five and a half feet of coal to 15 inches on the west, and its entire disappearance on the east, within a distance of six miles, equally with the entire absence of the two upper coals on the west, and probably also on the east, in the same space, is matter of reflection for the geologist.

MAGNETIC PLATINUM ORE OF NIJNI-TAGILSK.—The magnetic platinum ore found in the ground at Nijni-Tagilsk, Ural, has, according to Terreil, the following composition:—

Platinum with traces of iridium	81·02
Osmic iridium and platinum insoluble in aqua regia	3·33
Silver	trace
Copper	3.14
Iron	8·18
Nickel	0 75
Chrome iron (Cr_2O_3 1·75; FeO, 1·01; Al_2O_3; 0·37)	3·13
Silica	0·13
Aluminium, magnesia and iron, as silicates	traces
	99·68

Magnetic platinum ore treated with aqua regia gives an insoluble residuum, composed of iridium osmide, chrome iron, and a silicate. The latter is separated on treatment with potassa fusa, the iridium osmide and chrome iron remaining intact. Further treatment of the residue with a mixture of nitre and potassium separated the elements of the chrome iron, with quantitative determination of them. Nickel had not hitherto been found in platinum ores, and the relatively large proportion obtained from the Nijni-Tagilsk ore is a very interesting fact. Daubree has now made with Ferreil an investigation into the actual presence of nickel, on the occasion of two assays of original ferriferous and magnetic platinum. It was proved that the nickel, not yet shown in platinum ore found in the earth, was really present in both masses of metal. On the second investigation it was proved that the proportion of the nickel in the iron was as 1 to 11, or as high as in many meteoric irons.

ABSTRACTS OF LECTURES ON MINING.—No. VI.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(From the London "Mining Journal.")

THE last lecture was intended to point out to you a wide field for study, and after local study for generalization in dealing with the rocks through which the lodes pass, how in some cases they are favorable, in others unfavorable; but how there was, after all, a large margin o uncertainty, to which the miner always looks, as offering a field for further inquiry and speculation. I referred especially to the beds interstratified with the limestone of the North of England, and the influence they had on the lodes. In Derbyshire and Flintshire you find limestones of different character—dark grey, pale grey, and some almost black. We shall see that these, again, among themselves, have very different effects upon the lodes. I cannot give, perhaps, a more striking instance of this than where we have in Flintshire an upper limestone of a somewhat hydraulic character, and a lower pale grey limestone; hitherto the latter has been found to be extremely poor in minerals, as compared with the dark upper one. I am speaking in these cases only of the mineral in the lode itself, and not of that disseminated in the rocks. Prof. WHITNEY, in his work on the "Metallic Wealth of the United States," mentions another striking case of this kind in connection with certain mines in the Western States, which some 30 or 40 years ago yielded large quantities of lead ore. The rocks here were chiefly masses of limestone, belonging to the Upper and Lower Silurian formations, where it was very noticeable that the result of experience was to show that only in certain bands could large deposits of ore be expected, and that the others were quite poor, or even sterile. The descending series of the rocks in this locality was—(1) Niagara limestone; (2) galena limestone; (3) blue limestone; (4) sandstone; (5) lower magnesian limestone. The Niagara rock belonged to the Upper Silurian, the others to the Lower Silurian formations. The first one contained no ore at all, then a bed of shale intervened, followed by the galena limestone, so called from the large occurrence of that mineral in it. This galena limestone was of a dolomitic character, a point worth noticing by the mining student, because dolomitic rocks are so frequently associated with this class of ores: in this case the rock runs from 200 to 300 ft. in thickness. The galena limestone was followed by a blue limestone, in which very faint traces of ore could be found, while in the sandstone succeeding no lead ore at all was met with. The bed below was of a very similar dolomitic character to the galena limestone, yet, strange to say, it contained no deposit of ore what ever; it rested, again, on beds of sandstone.

Another remarkable case is in the Lake Superior district, where the stratification of the rocks is more obscure. Thus, at Keweenah Point, and some other places renowed for the production of native copper, the upper part of the ground consists of greenstone rock; next below that is a conglomerate, or ash bed; and below that an amygdaloid rock. The veins in passing through the greenstone are very sterile, in the ash bed they are very rich, while in the amygdaloid they are again poor, though that rock appears to exercise a favorable influence upon them.

I may remind you once more that whatever the rocks may be according to their composition, we have to look at something more—their physical condition. You may see, for instance, in the case of a dolomite such as that of which the Houses of Parliament are built, that you may get in one part an extremely hard and durable building stone, whereas in an adjoining bed in the same quarry, or even in the same bed at some little distance, a stone which both chemists and geologists would call by the same name as the first kind, will be so friable as to be readily crumbled between the fingers. It appears that in the case of veins passing through rocks which vary much in their physical aspect, such variations have been due to long-continued chemical action, which has been accompanied by the filling of the veins.

It is important that the mining student should not be withheld by prejudice from paying attention to particular rocks. For instance, if it be said in Cornwall and Devon pretty largely that you would not expect to find ore of lead in sandstone, the chances are that sandstones are scarce in those districts; whereas in other districts you will find that lead ores do occur in sandstone. We must judge of these points on a larger scale, by visiting different districts, or by what we can get from the literature of the subject, than the man does who has studied only one set of mines. In Cornwall, taking the lead veins again, it will be held that if they pass into a hill they are not likely to do well; and, as miners say, the weight of the hill has been too much for them, and has squeezed the ore out. In other districts the opposite opinion holds good—that unless the vein has a sufficient amount of cover it is not likely to do well. Again, in some class it may be held that soft rock is prejudicial to the probability of a vein turning out well, whereas now it is usually the case that they are associated with soft ground, in some cases so soft that extensive timber is required to prevent the walls falling in. Where the adjoining rocks are of a very dry soft character, it is generally the case that what we called "horse" occurs in the vein, some parts of the walls having fallen in, and the vein in general will be more or less flookany. With many English miners, again, it has been a matter of doubt wheather lead ores would ever be found in granite, because they do not find them occurring so in the south-west districts; but there are districts in which lead has has been worked, and worked auccessfully for many years, in granite—*e.g.*, in Wicklow, and in the province of Jaen, in the South of Spain. There are, however, some conclusions which are so widely observed and so general that they cannot be too forcibly impressed upon us; as, for example, the great improbability of finding tin veins in calcareous rocks, a thing entirely unknown hitherto; whereas the great relationship of tin to the granite is a point noticeable not only in our south-west districts, but also observed in France, in North Bohemia, in Saxony, in Spain, and in Australia, and, in fact, wherever the veins have been found.

It has been attempted to determine what is the quality of rocks which have proved most satisfactory as walls of the lodes, but I do not think any general results can be stated, except that rocks of a dark shaley character have in most districts been proved prejudicial to all ores, with the exception in some districts, perhaps, of ores of lead; but in the districts of Alston Moor and Yorkshire the rule holds good for those ores also. At Freiberg this question was made the subject of a very careful experiment, but, although they drew out a long list of rocks, I do not think any results can be obtained which have more than a local significance. In their list they placed simple clay-slate in the worst class, a kind of gneiss among the average, and the best ore bearing rocks were those where one vein is found passing through another, or passing through a material like those fahlbands of Norway. The miners in each district have generally a great experience in regard to the rocks of their particular district, and we can often obtain valuable information from them, to be checked, however, by wider experience of the phenomena of different districts. Not only have the surrounding rocks an influence on the vein, but in some cases the rocks are seen to be influenced by the vein—as, for example, in the walls of tin veins very frequently a large quantity of silica is found, which has probably made its way from the vein by means of water. In some cases the substances introduced into the rock will be minute crystals of iron pyrites, or perhaps tin, so much so that the rock may be profitably worked to some distance from the vein. In the same way I have seen in Bohemia leaflets of native silver in the rock, at the distance of 6 in. to 1 ft. from the lode, to which distance the rock was being worked.

We must now give our attention to the relations of the lodes to the surface ground, and this is necessarily of high importance, because it is at the surface of the ground that we have to make our acquaintance with them. By the surface of the ground here I mean the surface of the rock, leaving aside for the present the difficulties arising from this being covered with gravel, sand, or vegetable mould. And the first point, of course, will be that of the bearing. In England the bearing in most cases is referred to the points of the compass, so many degrees, for example, east of north, etc., and almost invariably this is the magnetic north. We must bear in mind that the magnetic north is a variable direction; and, therefore, in dealing with old maps and plans unless we know the variation at the period these were constructed we cannot rely upon them, Moreover, it may be that in some cases great delays, disappcintments, and even risks, may arise from this cause of the variation of the compass. In Germany, Norway, and some other countries, the old plan is adhered to of referring the bearing to a circle divided into hours, and thus a lode will be said to strike three, or to run from a certain point towards midnight and so on. And in the hilly districts of Yorkshire the men talk of a vein dipping towards the two or three o'clock sun. The line where the lode intersects the surface of the ground is called its outcrop, or back, or basset; and this back may show at the surface as a series of cliffs, especially with large lodes, hence the term reefs given to them in Australia (an unfortunate term, by the way,) and ledges in California. The question arises—Do all lodes make up to the surface or not? There are certain instances here and there (as at Foxdale, in the Isle of Man) in which lodes are not found at the surface, but are met with underground, and may then yield large quantities of ore. I cannot, however, undertake to vouch for their being carefully examined, I think it is a more likely case that such communication with the surface does exist, though it may he obscure, or in the form of small strings merely. We saw that veins varied considerably downwards, and we can conceive that such is the case here upwards. Some veins may run for great distances at the surface with great uniformity and boldness, others show very little at the surface compared with what may be found further down, and to this latter cause we must ascribe much of the slow progress of mining in many districts. The principal points of difference of the lodes in these respects depend upon certain changes, not only mechanical but chemical, which have taken place in them. In many districts it is notorious that none at all can be met with till you get down to a depth of 30 to 50 fathoms—*e.g.*, in Cornwall no copper ore of any note has been raised till 30 to 40 fathoms was reached; and the great mine of Przibram had to be sunk 20 to 30 fathoms before it became productive, although the lode was large at the surface, but filled only with soft brown iron ore.

The lodes may be expected to exhibit these changes more or less, according to the following circumstances: If the lode contains much pyrites, either iron, arsenical, or copper; if the lodes are large and jointed, and have large quantities of water passing through them (carrying, we must remember, carbonic acid along with it); if the rock at the sides is very porous; and if on the back of the lode you find bold rock with cracks and fissures which allow the water to pass in—in other words, if you do not find the back of the lode covered with clayey soil—the probability in all these cases is that the lode will be found not in its original condition, but changed for a great way down, and only those minerals remaining which resist change by oxidation. On the other hand, if the lodes are small, and what the miner calls "tight," that is compact, the back without frequent fissures, and the surrounding rock of a similar character; if the surface be covered, especially by anything or a clayey character, it will not unfrequently be found that the lode may hold up to the surface, and you may find deposits of fresh and good ore even to the "grass roots." This may be seen in some of the lead mines of Cardiganshire and Montgomeryshire, and in Spain.

Ferruginous masses of red and brown tints have received attention from the miners of all countries, even from a very early period because they are found in many cases to cover the valuable deposits of ore below. Such a substance is termed by the Cornish miner gossan, and on the appearance of the gossan an experienced miner will be apt to judge of the probability of finding ore below—nay, more, he will undertake to distinguish different kinds of gossan which accompany the different ores. As a general rule, the miner prefers a dark gossan, with not too much quartz in it, but of a somewhat friable character. In the same way gossan is termed by the German miners *eisen Hut*, meaning the "iron hat," and by the French *chapeau en fer*. In some cases this gossan may be found to penetrate a great depth—40 to 50 fms.—and I have here a specimen taken from the extraordinary depth of 150 fms. and you will see it is suffused with red oxide of copper. Generally speaking the gossan decreases gradually as the ore increases; but in the case of the Great Devon Consols Mine (one set of workings of which ceased unsuccessfully in the gossan, the subsequent renewal has yielded vast quantities of ore) they came down suddenly on a mass of copper ore, 20 to 30 ft. in width. The gossan has not only to be studied on account of the ore to be expected beneath it, but it may often often be found to be itself a useful material. Since, however, the surface changes I have spoken of—what were termed by Haidinger anogenic—are due principally to the influence of air and oxygen, we may expect to find in the gossan only those minerals which can resist such changes. In some cases, for example, it may be the precious metals, or silver ores, like the chloride or iodide, which we know to be the result of surface; or, again, tin ore, a very resisting material, is often worked in gossans, otherwise favorable, as in Cornwall. As an example of surface changes, we have the case where a lode shows brown iron ore at the surface, but at a depth of 20 to 30 fms. gradually changes to chalybite, and we have here a specimen of chalybite coated with this brown iron ore. I would recommend my hearers to pay particular attention whenever they have opportunities of studying a carefully selected series of these gossans, as, for example, in the museum above; or, again, the fine collection in the public museum of the town of Truro.

OVER 32,000 tons of American steel rails have been received in San Francisco from New York during the past year for the Southern Pacific Railroad.

MINING NOTES FROM NEVADA, COLORADO AND GEORGIA.

CONSUMPTION OF WOOD BY THE COMSTOCK MINES FOR 1876.—The consumption of wood on the Comstock and in mills and other works connected with the mines for this year it is estimated, will amount to about 260,000 cords, worth, at $12 per cord, $3,120,000. Of this 200,000 cords will be shipped by rail, 20,000 by the Carson River to its destination and 20,000 cords will be taken out of the river at points between Empire City and Dayton and hauled by teams to the mines and mills. The amount of wood sent down from the mountains through the flumes has been yearly increasing, while the amount of wood floated down the Carson River is steadily decreasing. The amount of wood floated down the river in 1874 was 140,000 cords; in 1875 it was 75,000, and this year, all told, it will not exceed 60,000. The reason of the decrease of the amount coming down the river is owing to the fact that the pine forests are each year cleared off to a greater distance from the stream and its tributaries. Eventually the standing forest trees remaining will be at such a distance from the river that it will be cheaper to build flumes through which to send down the wood than to haul it to the stream and then drive it. It is estimated that the amount of lumber and mining timbers which will be shipped to the Comstock during the year will be between ninety and ninety-five million feet. Nearly all of this will come by rail.

THE DOUGLAS TUNNEL in Clear Creek County, Colorado, has been driven into the mountain a distance of 660 feet. At a distance of 530 feet from the mouth of the tunnel a lode was crossed, which, at the point of intersection carried only a narrow vein of mineral, which was of low grade. About 45 feet further in a second lode was cut which carried a mineralized vein ten feet wide, with good walls. About 50 feet further another lode was crossed, carrying a mineral vein of about ten inches, the ore being gold and silver bearing. No drifting has yet been done on the second and third lodes; on the first lode, however, a drift has been run, and a shaft sunk 24 feet, at which depth a strong vein of solid galena, with some iron and copper pyrites, has been struck, carrying both gold and silver, the latter predominating, and showing by fair average assay 210 oz. silver per ton. At a distance of about 50 feet from lode No. 3, the tunnel breast is near another lode which, it is thought, will prove the strongest vein of the four. It was worked from the surface, some time since, by a shaft sunk 56 feet, and yielded returns at the rate of 280 ounces silver and $100 in gold per ton, from a mineral vein 6 to 12 inches wide in a four feet crevice. The tunnel strikes this lode at a depth of over 500 feet from the surface. We are assured that work will soon be resumed, and the tunnel driven until this lode is cut—probably a distance of 30 feet ahead; then an air shaft will be raised in one of the lodes to the surface, which will give good ventilation, and allow all parts of the mine to be worked.—*Georgetown Miner*, July 29th.

GOLD MINING IN GEORGIA.—The news from the gold mines is very encouraging. All the companies are in full blast, and most of them making money. The theory of deep mining is being fully demonstrated to be the thing in the Georgia mines—the lower the shafts go the richer the ore in every instance. There is a great deal of new and improved machinery going to the mines daily, and this Fall will find many of the shafts sunk to the depth of one hundred and fifty feet or more. Major JOHN A. JAMES, of the Ohio Mining Company, which is developing the celebrated Boly Fields vein on the Vesey Mine, passed through Gainesville last month, and exhibited between six hundred and seven hundred pennyweights of massive gold from the vein, which is rapidly improving in size and quality. The Pigeon Roost and the Etowah Mines are doing very well. In fact, all the mines are paying more than five hundred per centum on the investment. The Glad Mine is being drained, and now yields well in gold. H. D. INGERSOLL, of the Ingersoll Mills, White County, passed through Gainesville on his way to Atlanta, last month, with the second installment of gold taken out of his mines since the erection of the mill. It was the proceeds of only a few days, and amounted to several hundred dollars, in gold worth $1.12 to the pennyweight. DAVIS ALEXANDER showed us a half tea-spoonful of very fine gold washed from the surface with a few panfuls of dirt taken from the surface near the vein on his farm, three miles from the city. There is but little doubt of this being one of the best of mines when properly developed.—Gainesville (Ga.) *Southron*.

NOTES.

AUSTRALIAN GOLD RETURNS.—The London Custom House account of gold received from Australia in the first half of the present year states its value at only £1,918 985. This is 28 per cent. less than in the corresponding half of last year. The Australians, however, have much hope of the productiveness of deep quartz reefs.

The Oriental Mining Company at Stowell struck a lode in May at a depth of 1,060 feet, and on a trial crushing 7½ tons of stone yielded upwards of 48 ounces of gold.

The Port Philip Mine, at Clunes, during the same month, from 20 tons of quartz taken from between the 900-feet, and 1,000-feet levels, yielded 22 oz. of gold.

BELGIAN STEEL AGAIN OFFERED TO THE INDIAN GOVERNMENT.—M. PETIT, of Belgium, has offered to the Government of India steel rails of excellent quality, in quantity 2,950 tons, of a weight of 62 lb. per yard, at 228 francs, 82 centimes per ton of 1,000 kilogrammes, delivered free on board at Calcutta; and also 2,000 tons, 26 kilogrammes per French meter, at 231 francs, 45 centimes per ton of 1 000 kilogrammes. Steel rails can be bought at Liege at this moment at £7 4/. and German rails are offered for delivery, free on board, at the chief Dutch ports, at £8 5; but that £9 3/, delivered at Calcutta, a price at which English rail makers may well stand aghast.—*American Manufacturer*.

SILVERING METAL GOODS.—Dr. KAYSER, of Nuremberg, describes a process for giving a durable silver-like luster to all descriptions of metal goods. Five parts pure tin, Australian by preference, as being almost absolutely pure, are melted with one part copper, and the molten mass granulated in the usual way. The granulation should be rather coarse than fine. The granulated metal is prepared with water and cream of tartar, as free as possible from lime. To 100 grammes of metal about 0 5 gramme of ignited-nickel oxide is added, and the object to be treated is laid in the bath. After boiling for a short time the object is covered with a film having the exact appearance of silver, with the advantage of possessing a greater resistance to wear than tin or silver itself. The nickel oxide must of course be renewed from time to time. Copper or brass goods can be silvered without preparation; iron goods need coppering. If to the above bath carbonate of nickel be added, a film is obtained which is richer in nickel and darker in color. The color can be deepened from the hue of platinum to a blue black, according to the amount of the nickel salt.

PHOSPHOR BRONZE.—Phosphor copper used in the preparation of phosphor bronze, is prepared, according to Dr. H. SCHWARZ, as follows:—A crucible is fettled with a mixture of bone ash, silicic acid and carbon, granulated copper is laid in and covered with a quantity of the fettling mixture, and the whole is fastened down with a cemented cover. Soda and glass can be added to promote fusion. At a fusing heat, the silicic acid acts on the phosphate, the phosphoric acid is reduced to phosphor, and this is taken up as freed by the copper. On the occasion of an experiment, 14 parts silicic acid were added to 18 bone ash, and 4 powdered charcoal, 4 parts soda and 4 powdered glass, made up with a little gum water, for lining the crucible; the latter was closed, the copper put in, covered with the mixture and melted at a red heat. The lining mixture was but little incinerated. The copper grains appeared gray red, well run, and entirely free from blister. On analysis the copper gave 0·5 to 0 51 per cent. phosphorus. Another experiment gave copper with 3·25 per cent. phosphorus, which could be melted with six times its bulk of pure copper, for producing copper bronze.

PRIZES OFFERED BY THE NETHERLANDS SCIENTIFIC SOCIETY, HAARLEM, 1876.—Prizes are offered for essays on the following subjects:—(1) Complete experimental study of the possibility of decomposing water by a Daniel's cell. (2) The meteorological and magnetical phenomena which can be shown to be in connection with the solar spots. (3) Mixtures of hydrogen and carbonic oxide being ignited in the eudiometer with a quantity of oxygen insufficient for complete combustion, there remains a part of the two combustible gases, and the quantities of water and of carbonic dioxide formed are in the ratio of simple multiples of their molecular weights. Repetition and investigation of these experiments is asked for. (4) The society asks that the researches of Mr LOCKYER concerning the difference of the spectral rays of calcium be extended to other elements. (5) Collection of the experiments relating to the existence of bacteria in contagious diseases, with original researches. (6) Construction of a simple instrument for measuring temperatures above 350 degrees C. in degrees of the air thermometer. (7) Investigation into the influence which the different colors of the spectrum exert on the lower animals.

HEATING A TRUNNION COIL FIFTY-SIX TONS WEIGHT, AT WOOLWICH ARSENAL.—It was brought out of a furnace whose mouth, when it gaped, was like the opened west-end of a cathedral. NEBUCHADNEZZAR'S burning fiery furnace must have been nothing to it. The coil had been in fifty hours, and had been heated at a cost of somewhat over five-and-twenty tons of coal. Aided by two cranes, each capable of bearing 100 tons, and a pair of tongs weighing, I should think, six tons at least; an army of firemen, who to such work seemed dwarfed to Lilliputians, swung the coil on to a 750-ton hammer block, that had in turn for its foundation one hundred 50 feet piles 14 inches square. Here the coil stood erect like the peak of the Jungfrau transmuted into gold in the setting sun, as, like myself, many, I trust, of my readers have seen it from their hotel at Interlachen. CYCLOPS and his men were mighty fellows, but all their hammers put together would seem but a toy compared with that hammer which came thudding down upon this immense coil. The hammer-head weighed forty tons. With steam behind it, it has a force equal to 2000-feet tons. Feet tons, I need hardly explain, means tons possessing the force given to them by a one-feet fall. The hammer stood there at an elevation of some fifty-six feet. Most delicately, like POE'S raven, it came tap, tap, tapping; for these blows, mighty though they were, seemed but taps upon the brow of this iron Jungfrau, so firm and erect did the coil stand beneath them; nevertheless, you could see the effect. The glowing interstices in the twist gradually lessened; but even after the British CYCLOPS had expended all the power he chose to put forth, the outlines proclaimed the mass to be a coil still. The coil had not only to be compacted into a tube with comparatively solid sides, but it had to be kept perfectly true in its center. From the opposite side of the hammer was now, therefore, reared by the aid of the crane and another pair of gigantic tongs, a steel mandrel which the delicate attention of our friend CYCLOPS with his tap, tap, tapping soon forced into the center of the coil. His ribs thus blown out by the indigestible mass which he had been compelled to swallow, the 56-ton coil, now heavier by many a ton by reason of his meal, must have his sides well belabored. For this purpose, the surfeited coil is again clutched by the huge tongs and sent sprawling upon the block. Here CYCLOPS began again thumping away at the poor fellow as he lay prostrate; this time helping very considerably to close up his ribs.—*American Manufacturer*.

REPORT OF THE BRITISH COMMISSION ON THE DEPRECIATION OF SILVER.—The report of the Select Committee on the Depreciation of Silver, prepared by Mr. GOSCHEN, the chairman, has been issued. The committee do not make any recommendations with regard to legislation, but consider that "in view of the many uncertain elements to which they have pointed, and which necessarily enter into every calculation as to the future, they are not authorized to offer any further opinion as to the probable course of the silver market, beyond indicating, as they have endeavored to do, the various circumstances which have to be taken into account." The committee are of opinion that the evidence taken conclusively shows that the fall in the price of silver is due to the following causes:—

(1.) To the discovery of new silver mines of great richness in the State of Nevada.

(2.) To the introduction of a gold currency into Germany in place of the previous silver currency. This operation commenced at the end of 1871.

(3) To the decreased demand for silver for export to India.

It should be added—

(4.) That the Scandinavian Governments have also substituted gold for silver in their currencies.

(5.) That the Latin Union, comprising France, Belgium, Switzerland, Italy, and Greece, have since 1874 limited the amount of silver to be coined yearly in the Mints of each member of the union, suspending the privilege formerly accorded to all holders of silver bullion, of claiming to have that bullion turned into coin without restriction.

(6.) That Holland has also passed a temporary Act prohibiting, except on account of the Government, the coining of silver, and authorizing the coining of gold.

With regard to India and the East, the committee say:—

So much must depend upon the prosperity of the populations, on the abundance of the crops, in fact, on their powers of production, that it is impossible to make any forecast; and, as regards actual facts, no more can be stated than that, on the one hand, they have always possessed a very large power of absorbing bullion; while, on the other, that power has been diminished by the growth of the sums annually payable by India to the Home Government. The only facts in any calculation as to the future which are certain, and appear to be permanent, are the increased total production of silver, and the effect caused by the necessity of the Indian Government to draw annually for a heavy amount. Both are adverse to the future value of silver, as far as they go; but they may be partially counterbalanced by changes in the trade with the East.

AN OIL PIPE THREE HUNDRED MILES LONG.—The Pennsylvania Transportation Company, of which Mr. HENRY HARLEY is president, has been chartered by the State of Pennsylvania for the purpose of transporting oil from the oil regions to the principal Atlantic seaboard cities. The plan proposed is to run the oil through a four-inch pipe laid on the surface; the forcing power will be nine hundred pounds to the square inch; there are to be stations at distances of fifteen miles, at each of which an engine of a hundred horse-power will be erected to work a pump to continue the flow from point to point. The company having decided upon the construction of the work, the president sought the services of General HERMAN HAUPT. He pronounced the scheme, after a thorough examination, to be entirely practicable, and is now acting as engineer-in-chief. In view of the enormous product of oil in this country—thirty thousand barrels per day—and the rank it now holds among the leading articles of export, coupled with the exorbitant charges for railroad carriage from the wells to the seaboard, by the completion of the enterprise and its successful operation, a complete revolution will be accomplished in the handling of this article. As a proof of how valuable this traffic has been to the several railroads over which the oil has been borne, it is only necessary to say that up to the present time the railroad charges aggregate seventy-nine millions of dollars. The minimum cost of transporting oil by rail is fifty cents per barrel, and the minimum cost by the pipe process is sixteen cents. The average charge by rail is one dollar and a quarter. The estimated cost of the entire work, including fixtures, etc., is one and a quarter million dollars, and considering the difference in cost between this method and that by rail, upon the hypothesis that the company will discount at least twenty-five cents a barrel on rail rates, it will readily be seen that with all the expenses of operating, the first year's earnings will pay the first cost of the work. The Pennsylvania Company is the parent company, but there is also the Baltimore Transportation Company, chartered by the State of Maryland, and some five other companies are expecting to unite. The first objective point or terminus will be Baltimore, as being the most feasible and direct route for the pipes. Following which other termini will be established, in Philadelphia, New York, etc. The pipes being laid on the surface and there being no obstacle in the way of forcing the oil to any height, the line will literally be an air line, and the distance from the Oil Regions to Baltimore is three hundred miles. The oil will be distributed from the pipes into immense reservoirs with refining establishments adjacent. Of course the whole railroad system will oppose it, for it is taking from them a traffic from the very nature of which there could be no competition, but the advantage to the oil producers, who will have the entire control, will be immense, and the advantages which will accrue from such facilities to this important branch of our export commerce will be incalculable. The feasibility of this enterprise, so far as the passage of the oil through pipes is concerned, has been fully established by the present system in operation in the Oil Regions, where the aggregate length of the pipes conveying the oil from the several wells to the reservoirs is nearly two hundred and fifty miles.—*Boston Traveller*.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending July 29.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	44,941	1,016,013	69,363	1,840,629
D. L. and W. RR. Co	43,002	753,8·9	69,971	1,790,734
Penn. Coal Co	26,999	507,668	27,545	744,699
L. V. RR. Co	25,174	500,606	24,395	504,848
P. and N. Y. RR. Co	1,354	14,003	2,636	66,303
C. RR. of N. J	† —	599,204	56,727	484,229
Penn. Canal	12,714	179,029	15,329	65,595
	59,560	3,416,818	265,966	5,496,537
Lehigh Region.				
L. V. RR. Co	91,595	1,312,582	87,956	482,769
C. RR. of N. J	† —	585,872	47,970	146,902
D. H. and W. B. RR	1,550	23,724	4,109	41,964
	56,612	1,829,032	140,035	671,635
Schuylkill Region.				
P. and R. R. RR. Co	128,014	2,181,395	186,046	1,540,410
Shamokin & Lykens Val.	28,962	464,163	34,760	673,610
	156,976	2,645,558	220,806	2,214,060
Sullivan Region.				
Sul. and Erie RR. Co	220	26,629	—	5,557
Total	404,525	8,165,367	626,807	8,387,789
Increase	—	—	—	—
Decrease	—	—	—	—

* Year beginning January 1st.

† These reports were not received this week.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

Perth Amboy business:

	Tons.
Received for the week	20,110
Shipped for the week	21,769
On hand July 29	76,195

Freights to Boston, 90c.; Hartford, 90c.; New Haven, 60c.; New York, 35c.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 317,575 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	12,319	134,923	29,861
" " " South Amboy	9,898	238,949	50,782
Shipments at Coal Port (Trenton)	10,596	128,996	27,179
" South Amboy	15,400	250,629	116,383

Receipts of Coal at Boston, for week ending July 28, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	3,601	75,381	95,585
Philadelphia	14,325	571,202	424,023
Baltimore	2,870	130,186	154,168
Other places	4,801	268,381	230,574
Great Britain	102	4,620	2,224
Nova Scotia	620	20,601	25,296

The Production of Bituminous Coal for the week ending July 29, was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb	50,766	968,684
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	6,380	186,819
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,261	91,772
*East Broad Top	1,538	40 660
Clearfield Region, Pa.		
*Snow Shoe	695	31,260
*Tyrone and Clearfield	24,552	638,935
Allegheny Region, Pa.		
*Pennsylvania RR	4,052	118,410
Pittsburgh Region, Pa.		
*West Penn. RR	4,174	112,915
*Southwest Penn. RR	1,168	33,719
*Penn. & Westmoreland gas coal, Pa. RR.	15,621	428,983
*Pennsylvania RR	937	160,280

* For the week ending July 21.

The Production of Coke for the week ending July 21.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
West Penn. RR	1,339	26 610
Southwest Penn. RR	9,664	278,865
Penn. & Westmoreland Region, Penn. RR.	1,371	26,103
Pittsburgh, Penn. RR	1,138	102,042
Total	12,912	433,620

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Aug. 4, 1876

Anthracite.

As was anticipated, the demand since the first of the month has been very limited, and no particular change is looked for this month, unless the Combination should conclude to make a considerable advance in prices for the month of September, in which case there would probably be slight activity during the latter end of this month, caused by buyers, who are unaware that but little observance is being paid to circular rates, sending in their orders. From the experience of a reliable gentleman who has just made a thorough canvass of the market with the view of purchasing, a cash buyer can secure surprisingly low prices, and a vast amount of coal can be procured at such prices.

The public has received this week additional cause to distrust the Combination. A Boston retail firm, backed by one of the large companies, has advertised to sell coal at yard as follows: Broken, $5.50; egg, $5.75; stove, $6.25; chestnut, $5.25; and to deliver to any portion of the city at 50c. per ton additional. This action is said to have been brought about by underselling on the part of another large company. Respecting the cause for it we shall take no notice, but the action itself is a great breach of faith—both with other members of the Combination and buyers in general. Although the programme does not provide for the regulation of the retail coal business, yet this is nothing less than a special inducement offered consumers to take a particular coal, for it is being sold at less than the actual cost to certain dealers who have bought coal from this and other companies, unless the companies have been allowing concessions which of course they all deny. There are some, however, who have purchased coal without concessions or at best, very small ones, and these dealers will either have to do no business or do it at a loss, which must ruin many, and inventually react upon the companies who have been selling the coal, and some of them have already sustained such serious losses that we should think they would avoid courting further ones. The greatest error of some of the coal companies appears to be, in attempting to do and control too much, and such proceedings as the above mentioned only tend to still further extend their operations, for they will certainly have to manage the retail business of the country if this policy be pursued, and this will necessitate a large increase of capital, and introduce complications that will be more than the able gentlemen who compose the Board of Control can regulate, for they have more than their hands full now. Members of the Combination who depend upon reaching consumers through retail dealers, are now unable to dispose of their coal in Boston, so that some immediate and decided action must be taken or the whole public will look upon the programme of the Combination as a complete farce, as many do already. A correspondent writing from Boston under date of yesterday says, that still greater reductions are anticipated.

Bituminous.

There is nothing of especial interest to note in the condition of the bituminous coal trade. The business doing is only in a small way, although from latest reports to hand the shipments last week were very liberal, the Cumberland region again showing a slight excess over the corresponding week of 1875. This was owing to the causes mentioned in our last, the shipments this week being less, and finally being very much interrupted by a break in the Chesapeake and Ohio Canal which it is thought it will take several days to repair. The shipments over the Baltimore and Ohio Railroad are showing quite an improvement and in the distribution of Cumberland coal this road showed a loss of but 169-551 tons to July 31, as compared with the corresponding period of 1875, while the Chesapeake and Ohio Canal shows a loss of 118,541 tons.

Coal Trade of Philadelphia.

PHILADELPHIA, August 3, 1876.

Never was the trade thrown in such confusion as it is here at present, by resolutions and counter resolutions. The Schuylkill operators agreed last week to stop for two weeks, provided the company did the same. The idea was to resume with a good supply of cars—the present way of working being done at great loss—but the company having concluded to go on, it is likely the coal operators will do the same, with a supply of cars not likely to exceed 25 per cent. to 30 per cent. The advance in the price has been a great mistake. It stimulated very little before it took place, and has since greatly depressed the trade. Buyers who tried to save the advance ordered coal, and could not get it because the company would not supply the cars, they are very indignant, and there is no wonder Coal is selling now in Boston by retail for less than in Philadelphia, and it is deserved by the consumers of the last city that they should be made to pay for the support they give to the present system of extortions. A leading paper of this city, which sustains the Combination in a very abject way, had an article, last Monday, which for inconsistency and absurdities, beats anything ever written before, and attracts much attention.

There is no change in freights; the supply of vessels to the East is fair, but for Southern ports rather scarce.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich		
Philadelphia	$4 70	$6 00
" at S. Amboy	5 50	6 00
ed Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	4 25	5 75
Despard, West Va	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 35	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va	....	10 00
" Splint, " at Richmond	4 50	6 00
" Gas Coal at Richmond	4 00	5 50
Peytona Cannel, W. Va at Richmond	8 50	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75
Cumberland, at Baltimore	3 65@3 80
Clearfield f.o.b. Canton, Baltimore	3 75@....

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 95, f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at South Amboy, N.J., 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 95; at Greenwich, Phil. per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/0@11/	6 50@7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou	2 25	5 75

*** *Wholesale Prices of Anthracite Coal for Aug., f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.***

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 90	5 00	5 10	5 20	5 80	5 10
Pittston at Newburg	4 75	4 85	4 95	5 05	5 65	4 95
Wilkesbarre at Port Johnston	4 90	5 00	5 10	5 20	5 80	5 00
Plymouth, R. A.	....	....	5 10	5 30	5 90	5 10
Susque. Coal Co. at Amboy W.A.	4 90	5 00	5 10	5 20	5 80	5 00
Kingston at Hoboken	4 90	5 00	5 10	5 20	5 80	5 00
Lehigh Coals.						
Old Company at Port Johnston	5 40	....	5 20	5 20	5 80	5 10
Old Company's Room Run "	5 40	....	5 20	5 20	5 80	5 10
Sugar Loaf, Hobok. & Amb. "	5 40	....	5 20	5 20	5 80	5 10
Lehigh Coal Exchange "	5 40	....	5 20	5 20	5 80	5 10
Honey Brook Lehigh	5 40	....	5 20	5 20	5 80	5 10
Beaver Meadow at South Amboy	5 40	....	5 20	5 20	5 80	5 10
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 90	5 00	5 10	5 20	5 80	5 00
Schuylkill red ash	....	....	....	5 30	5 90	5 00
Shamokin white and red ash	....	....	....	5 40	5 90	5 00
Lorberry	....	....	6 00	6 00	6 00	5 05
Lykens Valley	....	....	6 45	6 45	6 45	5 50

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. York	40c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 70	$6 00	$5 30
Lackawanna coal, in yard	5 70	6 00	5 30
Wilkes-Barre, delivered	6 25	6 75	5 75
Lehigh & Locust Mountain, del'd	7 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	7 50	6 00

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb.	$18 00
Liverpool House Cannel " " "	.... 22 00
American " " " "	.... 13 00
Cannelton splint, " " "	.... 8 00
Cannelton Block, " " "	.... 8 00
American Orrel " " "	....11@14
Red Bank Cannel " " "	..... 14 00
Cumberland " " "	..... 7 00

Baltimore, Md. Aug. 1, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 87	$4 72
Broken	5 25	5 10
Egg	5 35	5 20
Stove	5 76	5 61
Nut	4 91	4 76
Shamokin, (red or white ash), and "Boston," free burning white ash,		
Egg	5 35	5 20
Stove	5 75	5 60
Lykens Valley, red ash,		
Egg and stove	6 30	5 73

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. $) 50@8 00

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Buffalo, N. Y. Aug. 1, 1876.

Reported by LEE & LOOMIS.

The following are the prices for Bituminous coal in this market for August. There has been a slight decline from previous quotations, and the volume of busi-

ness doing is not large. There is no change in the price of Anthracite coal for August.

Connellsville Coke, Gas, Steam, and Cannel Coals are offered, for the present, subject to our printed conditions, at the following prices per ton of 2,000 lb., delivered on cars at Buffalo.

	Lump.	Run of Mine.	Nut	Slack.	No. 1.
Connellsville coke	$5 15	..	..	..	..
Brookfield coal	4 25	..	$2 85	..	..
Briar Hill	4 25	..	..	..	..
Youghiogheny	4 30	..	..	..	..
Monterey	3 30	$3 25	..	$2 20	..
Catfish	3 30	3 25	..	..	..
Stoneboro	..	..	2 55	2 20	$2 30
		B'kn.		2 20	
Sterling Cannel	5 50	$4 75	4 50	..	..
Cameron	3 50	2 85	..	2 20	..
Reynoldsville	3 65	3 25	2 85	2 30	..
Buffalo Coal Co	..	3 00	..	2 10	2 50

Boston. July 29, 1876.

COAL still holds a small, steady business for cargoes of broken, egg, and stove sizes, but wholly outside of the combination lists. Exactly what the future has in store for the coal trade is a matter of very much interest. Numbers of retail dealers and manufacturers suggested to agents early last spring that they should want about such and such a quantity. A majority of them were induced to write a sort of contract, which it was understood would be optional with them wholly to be shipped if shipped at all, and yet very few comparatively of these would-be buyers have ordered a single cargo, and yet have been cash buyers twice and thrice a month for cargoes upon the open market.

These purchases have been made at from 40 to 70c under the combination rates, and yet the buyers seem satisfied with their coal both in quality and style, or else they would abandon so hazardous a business as the combination agencies would insist it is. This thing has gone so far that the coal pockets hereabouts are obliged to hold their trade, and, notwithstanding the August circulars are out, the streams have just a little more water, the necessities of steam users are not quite so pressing, and the wholesale market for Anthracite coals is decidedly in buyers' favor.

In the retail way the influence of this yield made on cargoes is apparent. Deliveries of stove and furnace coals have been made in Chelsea under $7, while the range on stove delveries in Boston is from $7 25 to $7 50, and guaranteed satisfactory coal at that. The August circular prices, f. o. b at Philadelphia, for white ash are: Chestnut, $4 65; Stove, $5 45; Egg, $4 85; Broken, $4 75 Lump, $4 55.

In Cumberland the market is quiet. The spot sales of cargoes are rather more favorable than to order, a shading of from 20c to 30c a ton being made, and free of bridges in addition. The inquiry, however, is chiefly for light-draft, small cargoes, but on spot and to order. Gas coals are listless.

In freights there is no change. The offers are hardly so free, from either New York or Philadelphia, but still no improvement in prices can be recorded.

Chicago, Ill. Aug. 1, 1876.

No change in prices of coal. Trade very dull.

Cincinnati, O. Aug. 1, 1876.

Reported by our Special Correspondent.

The following are the quotations in our market for coal—no change, I think, since last report. Stock on hand about the same.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	—
Pomeroy coal "	5 @5½c.	—
Kanawha " "	7 c.	—
Cannel coal, according to quality "	10 @16c.	—
The following are the retail prices delivered		
Youghiogheny	10c.	—
Pomeroy	8c.	—
Cannel	15@22c.	—
Kanawha Semi-Cannel	10c.	—
Anthracite, per ton	10 50@11 00	
Coke, at yard	7c.	—
Coke, hard and soft, delivered	9@10c.	—

Indianapolis, Ind. Aug. 1, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes) $9 75 per ton,
Lehigh, retail $11 50 per ton.

Louisville, Ky. Aug. 1, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to 10 50	

Screened Pittsburgh per load $3 00
Screened Raymond City 2 75
Pine Hill (Kentucky) 2 75
Cannel $5 to 5 50

Richmond, Va. Aug. 1, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Prices are now as follows:

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 00
" semi-Cannel	4 00	Clover Hill Coal	3 50
Coalburgh Splint	4 00	James River Bitum	3 30
Lewiston "	4 00	" " Carbonite	5 00
Kanawha Gas coal	3 90		

San Francisco, Cal.

From the *Commercial Herald*, July 27 1876.

Imports from Jan. 1st to July 16th:

	tons.		tons.
Anthracite	8,424	Vancouver Island	59,663
Australian	43,170	Rocky Mountain	132
Coos Bay	21,559	Seattle	55,424
Cumberland	3,749	Bellingham Bay	12,670
English	11,950	Chili	2 076
Mt. Diablo	54,601		

Last week we presented the detailed statistics of receipts at this port for six months past, showing increased receipts in 1876 of 11,679 tons. Imports this week have been moderate from all quarters, owing to fogs and adverse winds. The arrivals embrace 1 400 tons per *Germania* from Bellingham Bay; steamer *George W. Elder*, from New York, brought 173 casks Cumberland. There is a large fleet due here from all quarters, and with heavy stocks in store markets seem to favor the buyer, notwithstanding the receipts of Coos Bay and Wellington are, for the time being, accumulating in this market. As before published, English steam to arrive next Autumn has sold as low $7@7 50. Calfornia (Mt. Diablo), is held at $5.75 for screenings, $7.75 for coarse; Australian. $8@8.50, latter for *Wallsend*; Coos Bay, Vancouver, Bellingham Bay, Seattle, etc., $8@9; Anthracite, $12@14; Cumberland, $14@16—all for spot parcels. The *Pacific Tribune*, Seattle, W. T., of a late date, has the following article: "CUTTING DOWN.—Owing to the reduced value of coal in the San Francisco market, caused by the importation of immense quantities of British and Australian coals, there has lately been a cutting down in the force employed in the various coast collieries, and a corresponding reduction of the quantities of coal sent out. Seattle has felt this as well as other places, though to a less extent than Mt. Diablo, Coos Bay or Vancouver Island. On this subject, the Nanaimo *Free Press*, of July 5th has the following to say of the situation at that point: 'Owing to the depressed state of the coal market at San Francisco, and the loss of the Pacific Mail Steamship Company's contract, DUNSMUIR, DIGGLE & Co. called a meeting of the miners on Saturday last. The proprietors made a proposition to the miners to keep them all at work during the Summer, provided they accept a reduction of 20 cents per ton in the price of mining, so as to meet the extra expense of binning or storing the coal. The present price of mining is $1 per ton. The miners subsequently held a meeting, and decided not to accept the reduced price. The proprietors of the Wellington colliery then decided to shut down a portion of the mine, thereby throwing about 70 miners, mostly married men with families, out of employment; 36 miners are retained at work, to whom full prices are paid.'" Fr. bark *Cilaos* from Newcastle, N. S. W., arrived with 760 tons; *City of Athens*, from Sydney, with 669 tons coal, and 966 tons shale; *Eddystone*, from same, 660 tons coal; *Aureola*, 1,350 tons Seattle.

Montreal. July 31, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (½ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.34 per ton of 2240 lb., or $2.08 per net ton.

From Osceola to Greenwich, Phila. (say 248 miles) per T. & C. RR, per ton bituminous coal of 2000 lb., less drawback of $1.46. $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

Freights.

Representing the latest actual charters up to Aug. 3, 1876.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	†80	...	...	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	1 40	....	90
Bath, Me	1 00@1 35	1 35	1 40	90
Baltimore	....	....	....	....
Boston, Mass	1 15@1 30	1 40	145-50	92
Bridgeport, Ct	†1 00	1 35	....	55
Bristol, R. I	....	....	....	80
Cambridgeport, Mass.	$1 20@1 30	....	...	90
Derby	....	....	...	....
Dighton	....	....	....	....
East Cambridge	$1 15@1 25	....	....	$90
Fall River	1 15@1 20	1 40	1 35	80
Hackensack	*70	....	....	....
Hallowell, Me	....	....	....	....
Hartford	*70	....	1 65	90
Hoboken	†70	1 25	1 15	40
Hudson	....	....	1 35	....
Jersey City	70	....	1 15	40
Lynn, Mass	....	..	....	‡1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	71	....	1 30	....
New Bedford	1 15@1 25	1 40	1 40	80
Newburyport	1 25	1 53	1 55	1 00
New Haven	1 00	1 35	1 30	55
New London	1 20	1 35	1 35	65
Newport	1 10@1 20	....	....	80
New York	70‖	1 25	1 25	40
Norwalk	1 00	1 50	....	60
Norwich	1 20‖	....	1 40	70
Pawtucket	1 25‖	....	....	....
Philadelphia	....	....	....	....
Portland	1 00@1 20	1 30	1 40	90
Portsmouth, N. H.	1 25@1 30	1 55	1 60	1 00
Providence	1 10@1 20	1 40	1 35	80
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	1 70	....
Sag Harbor	....	....	....	1 00
Salem, Mass	1 20@1 25	1 40	1 50	90
Salisbury Pt., Mass	....	....	....	...
Stamford	....	....	....	60
Stonington	....	....	....	80
Taunton	..	...	....	...
Troy	†80	....	....	..
Warren, R. I	....	....	....	80
Wareham	....	....	1 45	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Aug. 4, 1876.

American Pig.—There is very little to say relative to the market for this article that has not been said over and over again for weeks. The demand continues very small and prices rather steady with neither indications of an immediate decline or advance. The small number of furnaces in blast are capable of supplying the requirements of trade, and stocks of iron show no material changes. We note sales in lots of about 800 tons of Nos. 1 and 2 Thomas iron at our quotations, and with this exception learn of no business worthy of note. We quote No. 1 at $22; No. 2, $20; and forge, $19@$20.

Scotch Pig.—Both the arrivals and sales are very small. We only learn of a sale of 100 tons of Glengarnock at $27.50. The following are the asking prices, which however, could likely be shaded: Eglinton, $27; Glengarnock, $28@$28.50; and Coltness, $29@29.50.

Rails.—We are reported no business in either iron or steel rails. The former are a little easier in price, and may be quoted at $38@$41 at mill, while the latter are still quoted at $56@$61.

Old Rails.—We are reported sales aggregating 1,700 tons during the two past weeks, at prices ranging from $20.50@$21.50

Scrap.—We are reported sales of 200 tons of boiler scrap, 150 tons of No. 1 wrought, and 300 tons of car-wheels on private terms. We quote No. 1 wrought at $28@$29.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut street, Philadelphia. Week ending Aug. 3, 1876.

Scarcely anything in the way of business to report since our last. There has been some inquiry for No. 2 and forge iron, and some sales of forge. We hear of more inquiries for No. 1 than for some weeks, and quite a number of small sales. Number 2 is so scarce that the foundrymen are buying No. 1 to mix with scrap, which is exceedingly plenty and cheap just now; this making

a cheap casting, as they have to do just now, to meet the demand for everything cheap. We report sales of 300 tons No. 1 Crane at $22; 100 tons No. 1 Montgomery, at $22.50; 200 tons No. 2 Montgomery, at $20.50; 500 tons gray forge, Crane $20. We quote No. 1, $22 to 23; No. 2, $20 to 20.50; gray forge, $19 to 20.50.

RAILS.—Nothing doing in new rails at this writing. We quote iron $39 to 42; steel rails, $57 to 59.

OLD RAILS are in light demand and drooping in price. Report sale 100 tons at $23. We quote $22 to 23.

SCRAP is plenty and dull of sale. Report sale of 150 tons at $25.50. We quote $25 to 28, and cast $15 to 19, stove plate, $11 to 12.

BAR IRON.—There is a little more doing this week than for several weeks past, but everything in iron is a drag just now. We quote Philadelphia bars at $2 35 firm.

Baltimore. Aug. 2, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change to note in the iron market; the business continues extremely dull in all its branches, with no prospect of any early improvement. We repeat last quotations as follows:

Baltimore Charcoal	$30@35	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C B.Blooms	65@67 00
" No. 2	21@22	Refined Blooms	50@55

Boston. July 29, 1876.

PIG is indeed listless, the reports of the week seeming to be prolific of gossips of foundries to close until the middle of August. There have been no sales nor any inquiries, while the market seems to have lost all quotable tone.

BAR is offering all the way from $49 to $55 per ton for guaranteed refined, with very little business doing, but the bulk of the sales that are made are billed at from $49 to $50, an occasional odd customer being let in at still a slight fraction less.

Exactly what has been the cause of this weakening to prices it is difficult to tell, but the fact is quite apparent that it is only the cash customers who get the benefit of these low ranges. This condition of affairs is a repetition of what has been the experience of the early spring, but the movement seems to have been inaugurated from a new quarter which the trade generally propose to meet. The business is again a losing one, which can hardly be an encouraging fact for the contemplation of the dealers in New York and Philadelphia, who, although a little weak for the past four weeks, will hardly slide down to meet the market at the Hub.—*Commercial Bulletin.*

Chattanooga, Tenn. Aug. 1, 1876.

Specially reported by J. F. JAMES pig iron broker, etc., 233 Market Street.

The market here has improved in demand since last report. The Southern foundries are entirely without stocks to meet their Fall trade in presses and gins, and considerable iron is now moving in that direction. Mill irons for the West are also in good demand, and some few fair sales have been effected at ruling prices. Stocks of all grades here are light. The following are the ruling prices on which four months time is allowed:

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$21@ 22
" " " " No. 2 foundry	20@ 21
" " " " gray forge	17@ 18
" and Georgia coke, No. 1 foundry	18@ 19
" " " No. 2 foundry	17@ 18
" " " " gray forge	15@ 16
White and Mottled	14@ —
Tennessee and Georgia cold-blast car wheel	23@ 24
Alabama " "	23@ 24
Old Rails	cash 22 00
Cast Scrap	" 12
Wrought Scrap	" 18@ 20

Cincinnati. Aug. 1, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market is very quiet, the demand being light, as usual at this time of the year. We quote:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$25 00@	—4 mos
" No 2, "	23 00@	—4 mos
" Mill	21 00@	—4 mos
Tennessee, No. 1, Foundry	23 00@24 00	—4 mos
Tennessee, No. 2, "	22 00@23 00	—4 mos
" Mill	21 00@	—4 mos
Missouri, No. 1, Foundry	@	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 50@	—4 mos
" No. 2, "	20 50@21 00	—4 mos
Ohio Mill	19 50@20 00	—4 mos
Missouri, No. 1 Foundry	25 00@	—4 mos
" No. 2, "	24 00@	—4 mos
" Mill	23 00@	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	—4 mos
Tennessee "	27 00@33 00	—4 mos
Missouri "	32 00@35 00	—4 mos
Alabama "	26 00@33 00	—4 mos

BLOOMS.

Charcoal	60 00@ 75 00	—cash

SCRAP IRON.

Cast	50c.@ 80	—cash
Wrought	1 00@1 40	—cash

Cleveland, Ohio. Aug. 1, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@
No. 2. " " "	26 50@
No. 1 Anthracite	25 50@
No 2, "	23 00@
No. 1, Bituminous	25 00@
No. 2, "	23 00@
American Scotch, No. 1, Cherry Valley	27 00@
" " B—1, " "	26 00@
" " No. 2, " "	24 00@
No. 1, Massillon	26 00@
B—1, "	25 00@
No. 2, "	22 00@

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	26 00@
No. 4 " " "	27 00@
Nos. 5 and 6 "	27 00@

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00@

FORGE IRON.

No. 1, Gray	22 00@
White and Mottled	20 00@

Louisville. Aug. 1, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

There is a better feeling in iron, and sales are more frequent. There is not so much disposition to press sales, and several brands that have changed hands at very low prices, on account of forced sales, are now held higher, and are selling at the advance. On other brands there has been no change in price. We make a partial revision of figures based on actual sales, as follows:

The usual four months is given on quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$23 00@25 00
No. 2 " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " "	21 00@22 00
No. 1, Mill, " " " "	19 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	22 00@23 00
No. 2, " " " "	20 00@21 00
No. 1, Mill, " " " "	19 00@20 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " " "	— @ —
No. 1 Mill, from Missouri Ores	24 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@45 00
" " Tennessee "	28 00@40 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@45 00

Milwaukee. Aug. 1, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1		$28 00
" " " No. 2		27 00
" " " No. 3, 4 & 5		25 00
" " " No. 6		25 00
Mil. Anthracite L. S., No. 1		27 00
" " " No. 2		26 00
Wisconsin Iron, No. 1		26 00
Mahoning Valley Bit's No. 1		32 00
" " " No. 2		30 00

Pittsburg, Pa. Aug. 1, 1876.

Specially reported by A. H. CHILDS.

The volume of business during the past week has been somewhat larger than the general average for a like period; but in other respects the market is unchanged.

No. 1 Foundry	24@25—4 mos.
" 2 "	22@23 "
Gray Forge	21@22 50 "
White and Mottled	18@20 "
Warm blast Charcoal	23@30 "
Cold blast Charcoal, Western	40@45 "

Richmond, Va. July 31, 1876.

Reported by ASA SNYDER, Esq.

Charcoal irons are inactive. Very few consignments are received here; these are promptly sold at quotations although the transactions are so light as scarcely to be worthy of attention.

Virginia Cold Blast Charcoal Pig Iron			$27 to $33
" Warm " " "			24 to 28
" " " Coke " "	1 X		23 to 24
" " " " "	2 X		21 to 22
" " " " "	3		20 to 21
" Anthracite	1 X		— to —
" "	2 X		— to —
"	3		— to —

San Francisco, Cal.

From the *Commercial Herald*, July 27, 1876.

We note advertisement of closing out sale of the large and extensive stock of manufactured goods of the late firm of THOMAS H. SELBY & Co. The steamship *Granada* for Panama carried en route to New York 206,253 lbs. pig lead; prices here are unchanged. The market for pig iron continues dull and depressed at mere nominal quotations. Sydney block tin has been sold at 18@18¼c. The arrivals of pig iron from Oregon continue to come forward in limited quantities, and the price obtainable about the same as No. 1 Scotch, say $30@32.50. Tin plate is in excessive stock. I.C. charcoal now quotable at $8.50.

Our monthly importations of foreign, American, and Oregon pig iron, for the first six months of 1875-6, compare as follows:

	1875. Tons.	1876. Tons
January	1,712	4,506
February	1,831	1,193
March	2.083	1,914
April	1,521	999
May	2,500	625
June	1,360	694
Totals	11,007	9 931
Decrease this year		1,076

St. Louis. Aug. 1, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

We have no changes to report since last letter, though prospects for a good Fall trade are very good. We quote same as last:

Mo. Stone Coal No. 1 Fy.	$25@26	
" " " 2 "	23@24	
" " Gray Mill,	22½@23	
" Charcoal No. 1, Fy.	23@24	
" " " 2, "	22@23	
" " Gray Mill,	22@23	
Tenn. " No. 1, Fdy	23@24	
" " " 2, "	22@23	
" " Gray Mill	22@23	
Va. Coke, No. 1, Fdy.	24@25	
" " " 2, "	23@24	
" "Gray Mill,	21@23	
H. R. Char. No. 1, Fdy.	25@26	
" " " 2, "	24@25	
" " Gray Mill,	24@25	
Massillon iron, A No 1	20@30	
" " B " 1	30@—	
" " " 2	20@—	
Cold Bl. Car Wheel, Mo.	30@33	
" " " Tenn.	30@33	
" " " Ala.	30@33	
" " " H. R.	33@35	
Mo. Charcoal Blooms	50@65	
" Scrap "	45@55	
" " hammered Billets	75@80	
Assorted Bar Iron 2 50, 60 days		
No. 1 Wrought Scrap 90c. cwt.		
Heavy cast "	70 "	
Light "	" 50	

Montreal. July 25, 1876.

We continue to quote: Pig iron Eglinton and Clyde $18@19.00; Carnbroe $19 00@20 00; American $21@23; Summerlee and Calder $19@20; Langloan and Gartsherrie $20@21; Coltness $20.50@21.00; Hematite $26@27. Bar, per 100 lb., Scotch and Staffordshire, $2.10@2.20; best do., $2.30@2.40. Swedes and Norway $4.75@5.50; Low Moor and Bowling, $6.50@7.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Aug. 4, 1876.

THE past week has been a very quiet one, so far as business is concerned, and although prices show no material change, there has been a general weakening tendency.

Gold Coin.—During the week under review, gold has ranged from 111¾ to 112½, and closed at 112.

Bullion.—The quotations of to-day are the same as a week ago, although they were a little better yesterday. Upon the whole the market has a more encouraging appearance. To-day's London quotation is 51d., weak; while here, we quote at 112¾@111 and in San Francisco at 15 per cent. discount. Gold bars are unchanged at ⅛@¼ per cent. premium.

Copper.—The sales during the week have aggregated about 300,000 lb. at 19¾c.@20c., the market closing with 20c. asked and 19⅞c. bid. The requirements of manufacturers are very small, and producers do not care to part with their copper at lower rates, so that business is almost at a standstill. There is a rumor that prices have advanced in London, but we are unable to confirm this.

Tin.—There is but very little business doing in pig tin and prices remain unchanged, London quoting £73 10/ for Straits while our prices are as follows: Straits and L. & F., 17c.@17¼c., and Banca, 21c.

Tin Plates.—These are very dull of sale and inclined to weakness, although prices remain unchanged as follows, gold, per box: Charcoal tins, $7.25@$7.50, and ternes, $6.75@$7; Coke tins, $6.25@6.50, and ternes, $6.

MESSRS ROBT. CROOKS & Co., of Liverpool, under date of July 20, say of Tin Plates:—"The situation remains unchanged, the tendency still being upwards, and last week's prices now refused by holders. Several of the works that were closed have re-opened, but ask full market rates and are really the only sellers who can deliver promptly. Holders of odd lots are standing for makers' prices almost, and the market at date is unquestionable firm. Still we think the following rates could, in most instances be worked for September-October, or even later deliveries."

Lead.—We note sales of about 400 tons of ordinary domestic lead at 6¼c., gold; 200 tons of corroding, and 300 tons of soft Missouri at 7·10@7·25c., currency. Since the above transactions took place, business has been very quiet.

Spelter and Zinc.—Several car loads of domestic spelter have been sold at 7¼c., and the asking price now ranges from 7¼@7½c. Sheet zinc is quoted at 8¼@8¾c., gold.

Antimony.—The demand is still light, and the quotations unchanged at 15¼@15½c.

Quicksilver.—This market is very unsettled, and it is impossible to give a quotation. The San Francisco market has declined to 43c. per lb., while in London the price is still £9.

The San Francisco *Commercial Herald* of July 27 says: "A week since we reported sales for export at 41½c., since then some 2,000 flasks have been taken for New York account, at 40c.@40¾c. No sooner were these New York orders filled than cable advices from London were received announcing a material rise in that market—say to £8 10/, July 21st, and previously as follows:

June 23	£8 15/
June 24	8 10/
June 20	8 00/
July 21	8 10/

The foregoing shows an advance of 10/ per flask since the 30th of June, the price having remained at £8 for the previous three weeks. From 1865 to 1870, or thereabouts, the product of the New Almaden Mines was sold under contract to BUTTERWORTH, MILLS, RALSTON, and associates, at $32 50@35 per flask, and then again renewed for two years to same parties, from April 1st, 1870, at $31 gold, per flask of 76½ lbs. The selling price during this time to exporters and others was 60c.

and upward, according to supply and demand. At this time there seems to be considerable stock in store which is generally held at 45c., but exporters say their limits will not allow them to pay over 42½c. The production is liberal, and there is no question but that the leading producers can well afford to sell at the current market price.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Aug. 4, 1876.

The extensive transactions noted in our issue of the 29 ult., were almost repeated during the operations of the week just ended, the total sales amounting to 106,602 shares against 109,648 shares for last week, showing a decrease of about 3,000 shares. The prices are lower almost without exception, and even from these rates they have been discounted from 1 to 3 per cent. at sellers options of 60 days. We note a steadier feeling in the market, especially during the latter part of this week, the range of prices in a regular sale in no single instance during one day exceeding one per cent.

New Jersey Central Railroad.—Nearly 39,000 shares of this stock have changed hands at from 60 to 60¾, closing ¾ per cent. in advance of the lower quotation, and a decline of 2 per cent. from the final price in our issue of the 29 ult.

A general reduction in most cases of 10 per cent. has been ordered in the salaries of all officers and employes of this company. It is said that a closer economy is to be enforced in other ways also. The locomotive engineers and firemen object to this reduction of 10 per cent. and even threaten a strike. The engineers have appointed a committee to confer with Superintendent RICKER and see if some compromise cannot be made.

Delaware, Lackawanna and Western Railroad.—66,455 shares of this stock have changed hands during the week, 4½ per cent. representing the range between the extreme quotations, the final price of 93¾ being 3⅛ per cent. below the quotation in our last.

Delaware and Hudson Canal Company, 667 shares comprise the dealings in the stock of this company, the quotations do not call for special comment unless it is in noting the fact of a sale of 100 shares on the 3d inst. at 97, seller 60 days.

The Scottish American Investment Company (Limited) have announced that they are prepared to receive subscriptions to an issue of $1,000,000 7 per cent. first consolidated mortgage bonds of $1,000 each of the Albany and Susquehanna Railroad Company, the principal and interest being guaranteed by the Delaware and Hudson Canal Company. The price of issue, including accrued interest from April 1st, is to be £205 per £200, £20 being payable on application, and £185 on August 15 The prospectus states that the above bonds bear the absolute guarantee of the Delaware and Hudson Canal Company for payment of the principal and interest in currency, and are secured by a mortgage, under which the total issue is restricted to $10,000,000. The Albany and Susquehanna Railroad is 142 miles in length, and runs through the center of the State of New York from Binghamton to Albany, the capital of the State.

The Delaware and Hudson Canal Company have a capital stock of $20,000,000, and a total funded debt of $15,116,000. The estimated value of the company's assets on December 31, 1875, was $37,888,593, and the total net earnings for 1875, after deducting expenses and taxes, amounted to $3,452,196.

The ordinary stock of the Albany and Susquehanna Railroad Company amounts to $3,500,000, on which dividends of 7 per cent., to be increased hereafter to 9 per cent., are guaranteed by the Delaware and Hudson Canal Company.

The Gilberton Coal Company of Boston will pay a dividend of 2½ per cent in lieu of 4 per cent. as paid in October, 1875.

The Harleigh Coal Company of Boston announces a dividend of $1 per share equal to a disbursement of $5,000.

The Andover Iron Company has its dividend period during the present month.

Scioto Valley Railroad.—This road reports its earnings for June increased fifty per cent. over May. The extension of the road to Chillicothe, Ohio, is greatly increasing business. Surveys are now being made for the continuation of the main line below Chillicothe. They have reached Portsmouth, running on the west side of the Scioto River, leaving Waverly about two miles to the east. A coal branch is also being surveyed.

Indianapolis and Sullivan Coal Railroad.—This is the name of a contemplated air line, narrow gauge road, from Indianapolis to Sullivan, a distance of about one hundred miles, and touching the coalfields at a distance of some fifty miles from Indianapolis. The cost of the road, equipped, is estimated at from $6,000 to $9,000 per mile. In view of the fact that Indianapolis annually consumes 8,000,000 bushels of coal, and is constantly adding to her already extensive manufacturing interests, the opening for such a road is claimed to be excellent. It would pass through the counties of Marion, Morgan, Owen, Clay, and Sullivan, and connect with the Evansville and Crawfordsville road at Sullivan.

Columbus and Hocking Valley Railroad.—This company owns and works a line from Columbus, Ohio, south-east to Athens, seventy-six miles, with a branch from Logan to New Straitsville, thirteen miles, making eighty-nine miles in all. Its report covers the year ending Dec. 31, 1875. Included in the equipment there are 31 engines and 1,000 eight-wheel coal cars. There are also on the road 808 eight-wheel and 100 four-wheel coal cars, owned by coal operators.

New York Central and Hudson River Railroad. This company has adopted a new standard coal car for its increasing anthracite coal traffic, and has now 400 of them under contract. The pattern adopted is a four-wheel car, similar to that used on the Central of New Jersey, but longer and carrying eight tons instead of six, which latter is the load of the New Jersey cars. They are to weigh about 9,300 lb. each, thus giving an unusual small proportion of dead weight, a matter of unusual importance in coal cars, which carry usually no other kind of freight and for the most part run in trains by themselves with full cars one way and empty the other. Aside from the supply of the country on its line (by itself affording a large traffic) the New York Central chief coal traffic is to lake ports chiefly to Buffalo for shipment to the Northwest.

Dayton and Southeastern Railroad. The construction of the Dayton and Southeastern railway, a narrow-gauge road, to the coalfields of Jackson County, Ohio, is progressing, with the prospect of a part of the line being in operation by October. The road is one hundred and four miles in length.

Coupons and Interest is due on the bonds of the following during the present month:

Central Railroad of New Jersey, 1st mortgage bonds of 1880.

Consolidation Coal Company. This company will pay the coupons on the 2nd mortgage, bonds of the Cumberland Coal and Iron Company.

Joliet Iron and Steel Company. Coupons.

United New Jersey Railroad Companies. Coupons, also coupons on the 1st mortgane bonds of the Steubenville and Indiana Railroad.

Pennsylvania Coal Company. Interest on the 1st mortgage 7 per cent. register bonds.

St. Louis and Iron Mountain Railroad. Coupons on the 1st mortgage bonds.

Vulcan Iron Works of Chattanooga, Tenn. interest on the bonds of this company will be due during the present month.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 4, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	*230	—
Consolidation Coal Co	40½	40	40	150
Spring Mt. Coal Co	—	—	55	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	*20	—
Del., Lack., and West. RR. Co	98	93¾	93¾	66,465
New Jersey Central RR. Co	66	60¾	61½	38,918
Delaware and Hudson Canal Co.	102	98	98	667
Quicksilver Mining Co. pref'd	—	—	14	—
" " " Common	13½	10	10	200
Mariposa Land & Min. Co. pref'd	8	8	7½	200
St. Louis & Iron Mountain RR	—	—	—	—
Lehigh & Wilkes-Barre Coal Co	—	—	—	—
Total Shares sold				106,600
Sales for the week previous				109,648
Decrease				3,048

* Nominal.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	.....	... @110½
" " " 7's Con'ble	J. & D.	.....	.... @ ....
Cent'l RR. of N.J., 1st M., New	F. & A.	....	.... @116
" " " 1st Cons.	.....	17,000	99⅞@100⅞
" " " Convert'le	M. & N.	21,000	92⅜@ 93
Lehigh & W.-B'e, Con. Guar'd.	.....	43,000	86 @ 87⅜
Am. Dock & Imp. Mt. Bonds	J. & J.	7,000	94½@ 95
Del. & Hud. Can., 1st M., 1891	.....	1,000	.... @111
" " " 1884	.....	.....	.... @ ....
" " " 1877	.....	.....	.... @ ....
" " " Coup. 7's, 1894	.....	3,000	.... @109
" " " Reg'd 7's, 1894	.....	.....	.... @ ....
St. L. & Iron Mountain, 1st M	F. & A.	.....	.... @ ....
" " " 2d M	M. & N.	.....	.... @*79
Chesapeake & Ohio 6's, 1st M.	.....	.....	.... @ 27½
" " Ex. Coupon	.....	.....	... @ ....
Mariposa Gold Loan con. 7s	.....	....	....@*100½
Total sales			$91,000

* Nominal.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, August 3, 1876.

A BREAK in the shares of the Hestonville (passenger) Railroad Company, from 42 to 26½, carrying with it the failure of several brokers who had been speculating in it, has had the effect in creating an irregular market, all of the quotations, therefore show increased fluctuations. The coal shares, however, have generally recovered, and in no instance do they mark a decline of over one point at the close. The total transactions amounted to about 80,000 shares, an increase of nearly 37,000 shares over the sales for the previous week.

Pennsylvania Railroad.—This stock has sold to the extent of 63,000 shares, between 49 and 52⅞ as the extreme prices, the unusual range in this stock is explained by the persistent rumors which were circulated just previous to the announcement of the dividend that a reduced rate would be declared, when the Board of Directors announced the usual quarterly dividend of 2 per cent., or $1 per share, a recovery set in, and the stock rapidly improved to 50½@¾, less the dividend, which 15 minutes before was selling at 49, with the dividend on.

Lehigh Valley Railroad Company.—1,227 shares of this stock were sold during the week at from 56 to 57 as the limit, closing at 56⅛, which is a point below the last quotation.

Reading Railroad.—The transactions in this stock have materially increased, the total amounting to over 15,000 shares. The extreme range in the prices for the common stock only amounting to one-half, the final price, showing an advance of one-eighth from our last. 150 shares of the preferred stock were sold at 45¾.

Lehigh Coal and Navigation Company.—This stock is three-quarter lower; 6,552 shares were sold during the week between 42 and 44, the closing price advancing five-eighths from the lower quotation. The dividend period of this company will occur during the present month.

Bonds are dull of sale without any noteworthy change in the prices.

Lehigh and Easton Railroad.—At a meeting of the board, held in Stroudsburg, Pa., July 25, a contract was let for the construction of the road from Hazleton, Pa., to Port Jervis, N. Y. The contractors are Eastern parties, who agree to begin work in August, and to complete the road by April 1st, 1877. The route is from Hazleton a little north of east to the Delaware River, above Stroudsburg, and thence north-east up the west of the Delaware to a connection with the Erie near Port Jervis. The distance is about 80 miles.

Coupons and Interest are due on the bonds of the following during the present month:

Catawissa Railroad.—1st chattel and new mortgage 7 per cent. bonds, coupons.

Delaware and Raritan Canal Company.—Coupons.

Huntington and Broad Top Mountain Railroad.—Second mortgage gold bonds. Coupons.

Lehigh Coal and Navigation Company.—Registered 6 per cent. loan of 1897, and Greenwood bonds of 1892. Interest.

Morris Canal Company.—Interest on scrip. Paid by Lehigh Valley Railroad Company.

Pennsylvania Railroad Company.—Interest on the United Company's loan of 1888. New Jersey Railroad and Transportation Company, loan of 1878. Joint Company's loan of 1883. Camden and Burlington Railroad Company, bonds. Perth Amboy and Woodbridge Railroad bonds. Belvidere and Delaware Railroad bonds. And the third mortgage bonds of the Pennsylvania Railroad Company.

Philadelphia and Reading Coal and Iron Company.—Interest on the 7 per cent. bonds.

The Sunbury and Lewistown Railroad went into operation on the 28th ult., under the management of the Pennsylvania Railroad. The road was completed in January, 1865, but was not opened. It is understood that all anthracite trains received at Sunbury for the trunk line of the Pennsylvania road, or points on its schedule, will hereafter go over this route instead of by way of the mouth of the Juniata. This, it is stated, will form a new and shorter outlet for anthracite coal.—*Hazleton Sentinal*, July 28.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 3, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares
Lehigh Valley RR. Co	57	56	56½	1,227
Pennsylvania RR.	52⅞	49	50⅛	63,201
Reading RR.	44½	44	44⅛	15,057
Lehigh Coal and Nav. Co	44	42	42⅞	6,552
Penn. Canal	—	—	*59	—
Buck Mountain Coal Co.	—	—	*25	—
Fulton Coal Co.	—	—	*3¼	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	85	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co.	16	16	15½	175
Crane Iron Co.	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	70½	—
Total shares sold				86,212
Sales for the week previous				36,421
Increase				49,791

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	—	— @108
" " " 2d " "	—	— @105
" " " 3d " cons	—	— @ 45
Lehigh Valley RR. Con. mtg. 6s	14,000	— @ 93¾
" " " 7s, 1910	3,000	— @113¾
" " " 6s Reg.	2,000	— @100
" " " C. M. 6s 1923	—	— @ 99½
Pennsylvania RR., 1st mtge. 6s	9,000	104½@105
" " gen. " con. 1910	—	— @104
" " gen. " 6s, reg.	—	— @100¼
" " Cons. M. 6s reg.	1,000	— @100
Phil. & Reading RR. 7s '93	5,000	— @110
" " G. M. 7s, reg.	—	— @104¾
" " " " 7s con.	—	— @100⅜
" " new convertible 7s	2,500	— @100¼
" " 6s 43-80	—	— @101
" " debenture 6s	1,100	76 @ 77
Phil. & Reading C. & I. Co. Deb. 7s	—	— @—
" " Locust Mount. tract	—	— @ 80
Lehigh Coal & Nav. Co., 6s '84	5,100	— @103
" " " RR. 6s, '97	1,300	— @103
" " " cov. m. 7s	—	— @—
" " 6s gold loan	11,000	103¼@103½
Penn. Canal, 6s	—	— @ 72¾
Penn. and N. Y. Canal, 7s	—	— @109
Ches. and Del. Canal, 6s	—	— @ 86
Susquehanna Canal, 6s	—	— @ 70
Delaware Division Canal, 6s	—	— @—
Susquehanna Coal Co. 6s	—	— @ 77
Buck. Mount Coal Co. 6s	—	— @—
Penn. Gas Coal Co. 6s	—	— @—
Honeybrook Coal Co. 7s	—	— @—
Total amount of sales	$55,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Aug. 3, 1876.

Market remains the same as previously reported. The following bids and asks will show the whole business. Allouez dull, no sales this week. Calumet little softer at 160¼ asked. Copper Falls sales to-day at 3. Some bid Duncan Silver strong at 1¾. All stock on which the assessment was not paid by August 1st, is forfeited. National strong at 1⅛ bid. Sale of 100 to-day at 1⅛. Quincy little weaker at 44½ to 45. The August dividend of $3 per share, is a little less than was expected, In small coppers nothing doing.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20,000	$ 6 00	$ 7 00
Calumet and Hecla	25	80,000	160 00	160 25
Central	25	20,000	30 50	31 00
Copper Falls	50	20,000	3 00	3 25
Dana	25	20,000	10	12½
Franklin	25	20,000	10 25	11 00
Humboldt	25	20,000	10	12½
Madison	25	20,000	27	30
Mesnard	25	20,000	37½	40
Minnesota	25	20,000	1 25	1 75
National	15	20,000	1 50	1 75
Osceola	25	40,000	20 00	22 00
Petherick	25	20,000	40	50
Pewabic	25	20,000	3 00	—
Phenix	25	20,000	12 25	12 75
Quincy	25	20,000	44 50	45 00
Ridge	25	20,000	4 25	4 75
Rockland	25	20,000	25	30
International Silver	20	60,000	9	12½
Star	25	20,000	37½	50
Superior	25	20,000	10	15
Duncan Silver	20	60,000	1 75	2 00

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, Aug. 4, 1876.

Mining shares continue to improve, our quotations from the San Francisco Stock Market indicating with but a single exception an advance throughout the list of from $1 to $16 per share. No doubt this is influenced in a measure by the improved condition of the market for silver. Our latest exchanges indicate that the most active operations are going on in all of the Comstock mines, and that everything is being done which is possible to get them into a productive condition at the earliest moment.

California is up $6 per share. The ore breasts on the 1,600-feet level of this mine are looking and yielding well. The July bullion product will probably amount to $1,400,000.

Consolidated Virginia is $2 per share better. Sinking the main shaft to the 1,550-feet level is being pressed ahead with all possible vigor. The use of the shaft for this purpose greatly interferes with the extraction of ore and the work in the other portions of the mine. The July product will possibly amount to $200,000, and maybe less. In the meantime the delay in extracting ore has been taken advantage of to advance all the prospecting drifts heretofore stopped in the southern portion of the mine, and thus prospect and complete the ventilation of that entire section. On the 1700-feet level the north drift from the Best and Belcher has reached a point opposite the south winze sunk below the 1550-feet level, and a side drift has been started to connect with the bottom of the winze for ventilation purposes. The drift is fearfully hot and can make but very slow progress The new cylinder head has been placed on the engine at the C. and C. shaft, and an initial cylinder added to make the engine a compound low pressure instead of a high pressure, as heretofore. In the meantime the water is being kept down by a constant use of the tanks. The shaft appears to be draining the entire surrounding country having even dried up the water as far south as the Gould and Curry shaft.

Chollar Potosi has made a notable advance of $16 per share. On the 1st inst. the quotation of this stock reached $101, the present quotation showing a decline of $6 per share from that figure. The present daily yield of this maine equals about 75 tons of ore, the work of sinking the main incline and placing the pumping machinery is progressing in a most satisfactory manner.

Ophir is up to $54 per share. Daily yield, 280 tons of ore, keeping the mills all steadily running. The ore breasts show well on the 1,600-feet level, both north and south. Driving the north drift, on the 1,600-feet level toward the Mexican line, is making favorable progress. Retimbering and preparing the 1,700-ft. level for more rapid prospecting operations is going steadily forward. Work on the main incline is being pressed at three different points with a strong force of workmen, and is making rapid progress. The mine is showing well at all points, and it will not take very long now to complete the main incline down to the 1,700-feet level, ready to then take a new departure, and ascertain what there is of value at and below that point.

The Redington Quicksilver Mining Company announce their regular monthly dividend of $10 per share.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	July 27.	Aug. 3.
Sierra Nevada	3,300	100,000	$15	$16
Union Consol'd	600	100,000	14	16
Mexican	600	108,000	34	37
Ophir	675	108,000	46	54
California	600	540,000	60	66
Consol'd. Virginia	710	540,000	56	60
Best & Belcher	540	100,800	46	49
Gould & Curry	612	100,800	16	17
Savage	771	112,000	19	22
Hale & Norcross	400	112,000	10	12
Chollar Potosi	1,400	28,000	79	95
Alpha Consol'd	306	30,000	39	43
Imperial Con.	468	500,000	5	6
Yellow Jacket	957	120,000	26	32
Kentuck	95	30,000	11	13
Crown Point	541	100,000	10	12
Belcher	1,040	104,000	17	21
Overman	1,200	38,400	70	82
Caledonia	2,188	100,000	9	10
Justice	2,100	105,000	24	25
Raymond & Ely	5,000	30,000	8	9
Meadow Valley	4,400	60,000	1	50
Eureka Consolid.	—	50,000	11	13
Eureka G. V.	1,680	20,000	3	3
Silver Hill	5,400	54,000	6	8
Julia	3,000	110,000	8	9

Gas Stocks.

NEW YORK, FRIDAY EVENING, August 4, 1876.

GAS stocks continue extremely dull, nothing having occurred to alter the very quiet condition which has prevailed in these for a long time past.

Nassau, Brooklyn, Gas Company.—About 100 shares of this stock has changed hands at 75½.

Harlem Gas Company.—This company has declared its semi-annual dividend of 4 per cent., payable on demand.

Malden and Melrose, Mass., Gas Company.—This company announces a dividend of 2½ per cent., instead of 3 per cent, as formerly.

The South Boston Gas Company announces a dividend of 3¾ per cent., an increase from 3 per cent.

The Chelsea, Mass., Gas Company paid a dividend of 3 per cent. July 15, a reduction of 1 per cent.

The Lawrence, Mass., Gas Company reduces their dividend from 5 to 4 per cent.

The Dorchester, Mass, Gas Company reduces their dividend from 3 to 2¼ per cent.

The Washington Gas Company, Philadelphia, has its semi-annual dividend period during the present month.

Joplin, Missouri, Gas Company.—An ordnance has been passed by the City Council of this place, and a contract made for providing it with gas.

Peoples' Gas Company, of Albany, N. Y. The coupons on the bonds of this company will be paid during the present month.

The La Salle and Peru, Illinois, Gas Company's Coupons, due during the present month, will be paid on presentation in New York.

Newark, N. J., Gas Companies.—The Gas Inspector reports for July that the minimum candle power of the Newark Gaslight Company's gas was 14·16; maximum, 16·14. Of the Citizen's Company's gas, minimum, 13·46; maximum, 15·19. The standard is 14.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	112	112½
" " Bonds	900,00	1,000	†3½	Feb. '76	105	
NewYork, "	4,000,000		5	Jan. '76	135	140
Metropol. "	2,500,000	100	5	Mar. '76	150	155
" " Certf.	1,000,000	....	3½	" "	103¼	
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1,850,000	50	4	Feb. '76	115	116
Manhattan"	4,000,000	50	10	July "	240	—
Brooklyn, B'klyn	2,000,000	25	5	June '76	180	190
Nassau "	1,000,000	25	4	Jan. '76	75	75½
" "Certf.	700,000	1,000	3½	Nov. '76	94	95
People's "	1,000,000	10	3½	Jan. '76	45	50
" "Certf.	300,000	1,000	3½	Jan. '76	85	87½
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	70	75
Wmsburgh "	1,000,000	50	5	Jan. '76	125	130
" "Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	88	90
" "Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.	386,000	20	5	July, '75	160	—
Centl. Westch. N.Y.	466,000	50	4	July, "	95	100
Sub ur'n " "	390,000	50				95

† Gold.

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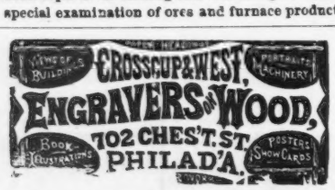

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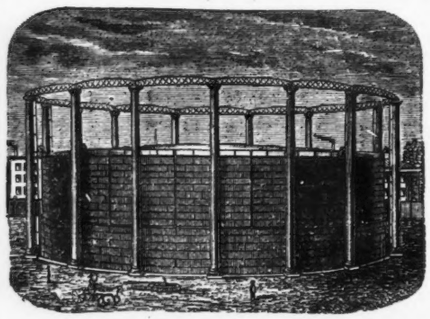

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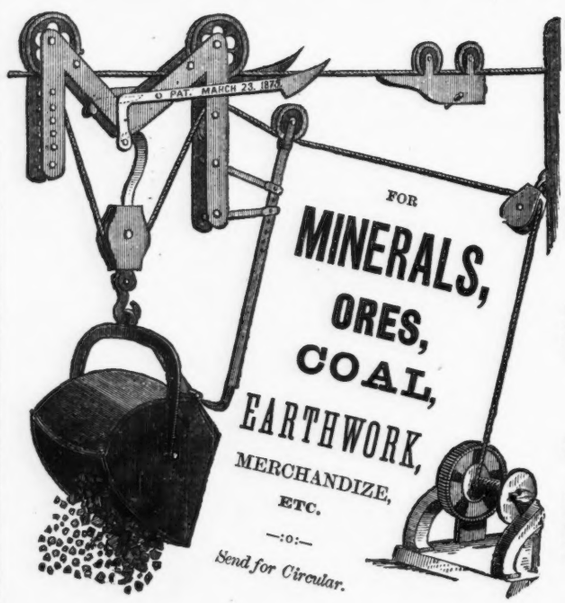

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